OCTOBER 1908.] [Price 10s.

PROCEEDINGS

OF THE

LINNEAN SOCIETY OF LONDON.

120TH SESSION.

FROM NOVEMBER 1907 TO JUNE 1908.

LONDON:
PRINTED FOR THE LINNEAN SOCIETY,
BURLINGTON HOUSE, PICCADILLY, W.,
BY TAYLOR AND FRANCIS, RED LION COURT, FLEET STREET.

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Publications of the Society issued during the period, 31st July, 1907, to 31st July, 1908:—

Journal (Botany), No. 264, 14th Oct., 1907.
„ 265, 11th Jan., 1908.
„ 266, 3rd June, 1908.
„ (Zoology), No. 196, 14th Oct., 1907.
„ 197, 31st Mar., 1908.
„ 203, 21st Dec., 1907.

Transactions (2nd Ser.) Botany, Vol. VII. Part VI., Oct. 1907.
„ VII., Nov. 1907.
„ VIII., Jan. 1908.
„ IX., Jan. 1908.
„ (2nd Ser.) Zoology, Vol. IX. Part XIII., Aug. 1907.
„ XIV., Oct. 1907.
Vol. X. Part VIII., Oct. 1907.
Vol. XII. Part I., Sept. 1907.
„ II., Dec. 1907.
„ III., May 1908.

Proceedings, 119th Session, from November 1906 to June 1907 October 1907.

List of [Fellows, Associates, and Foreign Members], 1907–1908.

PROCEEDINGS

OF THE

LINNEAN SOCIETY OF LONDON.

(ONE HUNDRED AND TWENTIETH SESSION,
1907–1908.)

November 7th, 1907.

Prof. W. A. Herdman, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 20th June, 1907, were read and confirmed.

Mr. Arthur William Garrard Bagshawe, M.B., and Mr. William Percival Westell were admitted Fellows.

The following persons were proposed as Fellows :—Dr. Nelson Annandale, Mr. Stanley Arden, Mr. Henry Atkinson, Dr. Joseph Barker, Dr. Frederic Hungerford Bowman, Mr. David Thomas Gwynne-Vaughan, Mr. James Thomas Hamilton, Dr. Frederick Keeble, Prof. Alexander Meek, M.Sc., Mr. James William Oliver, Mr. Linsdall Richardson, Mr. John Crosby Smith, Mr. Thomas Southwell, Miss Eva Whitley, and Mr. William Robert Worthington Williams.

Mr. Frank Arthur Stockdale was elected a Fellow.

A letter from Sir Joseph D. Hooker, G.C.S.I., F.R.S., dated 11th July, 1907, in reply to the address of congratulation sent from the General Meeting held 20th June last, was read by the General Secretary, as follows :—

The Camp, Sunningdale,
July 11, 1907.

Dear Dr. Daydon Jackson,

Your letter of the 21st ult., conveying to me the welcome congratulations of the President and Fellows of the Linnean Society on the approach of my 90th year of age and the 65th of

my Fellowship, has touched me deeply, and I beg of you to transmit to them my profound feelings of esteem, fraternity, and gratitude for this token of their abiding friendship.

With the exception of an ephemeral Entomological Society, the Linnean was the first to open its arms to me, and this as a son and grandson of two of its own body rather than as a worthy aspirant to the honour of Fellowship, and I shall never forget the pride and satisfaction with which I first added F.L.S. to my name.

As time advanced and writings, the results of my own researches, were honoured by admission into its publications, my affection for our Society and interest in its labours redoubled; but it was not till the efforts of some devoted Fellows, in which I was privileged to share, had persuaded the Lords of the Treasury that the Society was so worthy of recognition as to justify their granting it quarters at the national cost, did I feel that its future sphere of scientific action and its resources were adequately ensured.

That this grant in aid was as wisely as well bestowed on the part of the Government is evidenced by the number of calls, direct and indirect, it has made on the Society for advice on the fitting out and conduct of scientific expeditions, in combating tropical diseases, in apportioning rewards for researches and discoveries, and in many other ways.

That the subsequent great advance in the Society's well-being and sphere of utility has not been primarily due to extraneous aid, a retrospect of its condition during five years of its existence, when I knew it as a visitor only, and from many succeeding ones of my Fellowship sufficiently shows.

There were years, which I remember, when the number of attendants at the evening meetings might often be fingered on one hand; when the dearth of scientific contributions for occupying the hours of meeting compelled the Society to resort to reading Hamilton's Commentary on Rheede's three-century old 'Hortus Malabaricus,' which was abruptly discontinued only after having monopolised eight evenings, and that only in 1852, a time when the President sternly discouraged any discussion on the papers read, and when the idea of a lady visitor at a meeting was never entertained.

I cannot conclude without an allusion to the Society's commemoration of my own Fellowship by the magnificent medal struck in my honour, and the award of another which bears the bust of the great man who gives his name to our Society, and who is in many senses its founder. For such tokens of regard, coupled with the congratulations now received, I cannot voice my feelings of gratitude.

Very sincerely yours,

(Signed) Jos. D. Hooker.

Dr. B. Daydon Jackson,
Secretary L.S.

A vacancy in the list of Associates, in consequence of the death of Mr. Frederic Moore, the entomologist, was announced from the Chair.

The General Secretary exhibited a copy of the second edition of Hudson's 'Flora Anglica,' 1771, on behalf of Mr. Alexander H. Stevenson, of Dundee, who had picked up the volume in a dilapidated state on a bookstall. It contains numerous notes by Rev. William Kirby, an early Fellow of the Society, who spent his entire clerical life of 68 years in the parish of Barham, a few miles from Ipswich in the direction of Saxmundham. Many of these notes relate to localities in the neighbourhood, recorded in 1797, judging from the few which are dated.

Dr. A. B. Rendle exhibited an abnormal specimen of *Eucalyptus salmonophloia*, F. Muell., from West Australia, of two stems horizontally connected by new growth. The Rev. J. Gerard, S.J., who referred to similar cases in the yew (*Taxus baccata*), and the Rev. G. Henslow commented on this exhibition.

The following papers were read :—

1. "On the Origin of the Di-trimerous Floral Whorls of certain Dicotyledons." By the Rev. G. Henslow, M.A., F.L.S.
2. "Unrecorded Acari from New Zealand." By Albert D. Michael, F.L.S.
3. "On *Ænigmatistes africanus*, a new genus and species of Diptera." By R. W. C. Shelford, F.L.S.

November 21st, 1907.

Prof. W. A. Herdman, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 7th November, 1907, were read and confirmed.

The following persons were proposed as Fellows :—Mr. James Masson Hector, B.Sc. (Aberd.), and Mr. Charles Francis Massy Swynnerton ; also as Associate, Mr. Herbert Clifton Chadwick.

Mr. Walter Henry Baker, Mr. Reginald Evelyn Child Beale, and Dr. John Tanner were elected Fellows.

Mr. C. W. Anderson exhibited a specimen of a light-giving larva brought by him from near the boundary of British Guiana with Brazil, exhibiting when living a ruby light in its head, and a double row of phosphorescent spots along the body, two on each segment. These lights were not intermittent but glowed continuously. This presumed coleopterous larva was called "Macadoub" by the natives, and is not uncommon in the region named.

Prof. A. Dendy, Sec.L.S., in opening the discussion, called attention to the paper by Mr. Andrew Murray in the Journal of the Society, Zoology, vol. x. (1868) pp. 74–82, with a later note by Mr. Roland Trimen, in the same volume, pp. 503–4 issued in 1870. Other speakers were, the General Secretary, Dr. Murie, Dr. Calman, Mr. C. J. Gahan (a visitor), Mr. H. N. Ridley, and were replied to by Mr. Anderson.

Prof. Dendy exhibited two living specimens of *Peripatus* from the Cape, which he had succeeded in keeping in excellent health, by supplying them with woodlice as food. Dr. Murie and the Rev. T. R. R. Stebbing contributed additional remarks.

Mr. G. C. Druce showed dried specimens of *Linaria arenaria*, DC., which he had gathered near Barnstaple this autumn, but which had no pretension to be native, as it had been sown there fifteen years earlier. Further he exhibited herbarium specimens of *Leontodon hirtus* var. *Pristis*, G. C. Druce, from Guernsey and Alderney, and *Picris hieracioides* var. *incana*, G. C. Druce, from the latter island.

The President, Rev. T. R. R. Stebbing, Prof. J. B. Farmer, Mr. J. C. Shenstone, Mr. F. N. Williams, and Prof. Dendy took part in the discussion which followed, the last speaker calling attention to the transportation of animal organisms with living plants.

The following papers were read:—

1. "Abnormal Structures in Leaves and their Value in Morphology." By W. C. Worsdell, F.L.S.
2. "Two New Species of Amphipoda." By the Rev. T. R. R. Stebbing, M.A., F.R.S., F.L.S.
3. "The Preservation of Specimens in Australian Museums." By J. G. Otto Tepper, F.L.S.

December 5th, 1907.

Prof. W. A. Herdman, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 21st November, 1907, were read and confirmed.

The following persons were proposed as Fellows:—Mr. Walter Barratt, Mr. Frederick James Chittenden, Mr. Walter Edward Collinge, M.Sc., F.E.S., Mr. Arthur William Hill, M.A. (Cantab.), Mr. Joseph Hubert Priestley, B.Sc. (Lond.), and Miss May Evelina Bainbridge, B.Sc.

The following were elected Fellows:—Dr. Nelson Annandale, Mr. Stanley Arden, Mr. Henry Atkinson, Dr. Joseph Barker, Dr. Frederic Hungerford Bowman, Mr. David Thomas Gwynne-Vaughan, Mr. James Thomas Hamilton, Prof. Frederick Keeble, Prof. Alexander Meek, M.Sc., Mr. James William Oliver, Mr. Linsdall Richardson, Mr. John Crosby Smith, Mr. Thomas Southwell, Miss Eva Whitley, and Mr. William Robert Worthington Williams.

Dr. O. Stapf, F.L.S., exhibited a series of specimens of *Spartina Townsendi* representing different stages of development and tall and dwarf forms, and for comparison also typical specimens of *S. alterniflora*, *S. stricta*, and, on behalf of Messrs. H. & J. Groves,

S. Neyrautii from the estuary of the Bidassoa River. The specimens of *S. Townsendi* and *S. stricta* were collected by the exhibitor in the Isle of Wight; those of *S. alterniflora* near Millbrook Station in Southampton Water. He pointed out the morphological differences of the three English species, which show *S. Townsendi* to hold in many respects an intermediate position between *S. alterniflora* and *S. stricta*, although it is different enough to be treated as specifically distinct from either. He then described the distribution of the three species, and more particularly that of *S. Townsendi*, which was first collected near Hythe in 1870 and distributed as *S. alterniflora*. Three years later the brothers Grove found it again in the same locality, and in 1881 they recognised it as a distinct new species and named it *S. Townsendi*. At present it covers many hundreds or may be thousands of acres on the muddy foreshores of the Hampshire coast and the Isle of Wight, threatening *S. stricta* with extermination in some places. There are three theories to explain the appearance of the grass, which is too conspicuous to have been long overlooked :—(1) It may have been introduced, like *S. alterniflora*, which is a common mud-grass on the Atlantic coast of America from Newfoundland to Brazil. Lord Montagu has, in fact, stated that the people on the shores of Southampton Water have a notion that it was introduced by an Argentine ship. But so far, no *Spartina* corresponding to *S. Townsendi* has been found in America, and the Argentine species, mentioned by Arechavaleta and Stuckert, are distinctly different. (2) It may have originally arisen as a mutation of *S. stricta*, and, the characters having become fixed, the progeny now behaves like an ordinary species. Against this may be argued that there is no evidence, historical or morphological, for this assumption. (3) It sprang from a fertile hybrid or hybrids between *S. alterniflora* and *S. stricta*, and has assumed the character of a particularly vigorous and fairly constant species. In favour of this theory two circumstances may be adduced: first, the fact that *S. Townsendi* combines actually not a few of the distinctive characters of both species; and secondly, that it has an almost exact parallel in *S. Neyrautii*, which was described as a hybrid of *S. alterniflora* and *S. stricta* from specimens found growing among the parents in the estuary of the Bidassoa. This *S. Neyrautii* differs from *S. Townsendi* only in the more pronounced accentuation of the characters derived from *S. alterniflora*. The Adour and the Bidassoa Rivers on one side and Southampton Water on the other are the only two places in the world, so far as we know, where *S. alterniflora* and *S. stricta* meet; and it would be a case of extraordinary coincidence if *S. Townsendi* and *S. Neyrautii* should after all be found to have been introduced from some other part of the world just into those two localities. An attempt of artificial crossing of *S. alterniflora* and *S. stricta* should be made. Dr. Stapf finally spoke of the grass as a mud-binding and land-reclaiming species.

A discussion followed, in which the President, Mr. H. Groves, Mr. J. C. Shenstone, and Prof. F. W. Oliver engaged.

The following papers were read :—

1. "On a Collection of Plants from Gunong Tahan, in Pahang, by Mr. H. C. Robinson." By Henry Nicholas Ridley, M.A., F.R.S., F.L.S.
2. "Report on the Alcyonaria of the Red Sea." By Prof. J. Arthur Thomson. (Communicated by the President.)
3. "Report on the Crinoidea of the Red Sea." By H. C. Chadwick. (Communicated by the President.)
4. "Notes on some Marine Algæ of the Red Sea." By Prof. R. J. Harvey Gibson, M.A., F.L.S.
5. "Hydroid Zoophytes from the Red Sea." By Miss L. R. Thornely. (Communicated by the President.)

December 19th, 1907.

Prof. W. A. Herdman, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 5th December, 1907, were read and confirmed.

The President read an Address to H.M. Gustaf V. of Sweden on the death of our late Honorary Member, H.M. Oscar II., which was unanimously adopted, signed by the President and Secretaries, and ordered to be sent to His Excellency the Swedish Minister for transmission.

Professor Frederick Keeble, Miss Eva Whitley, and Mr. William Robert Worthington Williams were admitted.

Mr. Edward Charles Stuart Baker, Mr. Edward Alfred Cockayne, M.A., B.M.(Oxon.), Miss Emmeline Crocker, and Mr. Philippe Levêque de Vilmorin were proposed as Fellows.

Mr. James Masson Hector and Mr. Charles Francis Massy Swynnerton were elected Fellows, and Mr. Herbert Clifton Chadwick was elected an Associate.

Dr. G. Archdall Reid read his paper, communicated by Sir Ray Lankester, K.C.B., F.R.S., F.L.S., "On Mendelism and Sex," of which the following is the Author's abstract :—

Species are adaptional forms which have arisen under the operation of Natural Selection. The evidence is plain that, speaking generally, variability is controlled and regulated by Natural Selection ; therefore variability itself is, in a real sense, an adaptation. Nearly all variations are spontaneous as is proved by a mass of evidence afforded by human beings ; Natural Selection builds solely on spontaneous variations. When selection ceases as regards any character, that character tends to retrogress ; therefore retrogressive variations tend to predominate over progressive variations. This tendency to retrogression is very useful and has played an immense part in adapting species to their

environments. The author then touched upon blended and alternative inheritance; fluctuations and mutations; differences between Artificial and Natural Selection; and differences in the mode of reproduction of sexual and non-sexual characters. The mode of reproduction of mutation tends to resemble that of sexual characters; when conjugation occurs there is an appearance of alternative inheritance as regards both sexual characters and mutations, but it is an appearance only. The evidence is plain that there is only alternative reproduction combined with latency of one alternative and patency of the other, and actual blending between the patent character of one individual and the latent character of the other, therefore blending is universal. This tendency owing to the predominance and prepotency of retrogressive characters tends to cause retrogression on cessation of selection, and this is the function of sex.

The President having invited discussion, the following speakers took part:—Mr. A. O. Walker, Mr. J. T. Cunningham (visitor), Mr. A. D. Darbishire (visitor), Dr. W. T. Calman, Mr. G. P. Mudge (visitor), Prof. Dendy, Sir E. Ray Lankester, and Prof. Poulton, Dr. Archdall Reid briefly replying.

January 16th, 1908.

Prof. W. A. Herdman, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 19th December, 1907, were read and confirmed.

The Rev. Dr. Joseph Barker, Mr. Charles Francis Massy Swynnerton, and Mr. Henry Atkinson were admitted Fellows.

Miss May Evelina Bainbridge, B.Sc., Mr. Walter Barratt, Mr. Frederick James Chittenden, Mr. Walter Edward Collinge, M.Sc., F.E.S., Mr. Arthur William Hill, M.A. (Cantab.), and Mr. Joseph Hubert Priestley, B.Sc. (Lond.), were elected Fellows.

Mr. A. P. Young exhibited a series of lantern-slides to show various stages of soil-denudation and forest destruction in the Tyrol.

The slides from photographs taken in two valleys, one north of the Brenner Pass, the Navistal, near Innsbruck, and one south of the Pass, the Schalderertal, near Brixen, illustrated various limits, commencing near the upper limit of the vine cultivation at about 700 m. to the snow limit at about 2800 m.

Great waste of soil is caused in forest land by the simultaneous felling of trees over single plots of ground, and in the higher levels by the encroachments of grazing animals. One effect of this waste is the recession, not only of the tree line, but also of the limit of continuous forests, which is generally considered as distinct from the tree line.

Waste of soil in high-level pastures was also attributed to the

formation of tracks by grazing animals. The grooves are often quite bare of vegetation, and therefore open to rapid denudation by rain-water.

The following papers were read:—

1. "Notes on *Brassica* Crosses." By Arthur W. Sutton, F.L.S.
2. "Revision of the Genus *Illigera*." By S. T. Dunn, F.L.S.
3. "New Coniferæ from Formosa." By Bunzō Hayata. (Communicated by W. Botting Hemsley, F.R.S., F.L.S.)

February 6th, 1908.

Dr. A. B. Rendle, M.A., Vice-President, in the Chair.

The Minutes of the General Meeting of the 16th January, 1908, were read and confirmed.

Mr. Walter Barratt and Mr. Arthur William Hill were admitted Fellows.

The Rev. George Henry Aidan Elrington, D.Sc., Mrs. Marian Sarah Farquharson, Mr. Charles Francis Ullathorne Meek, and Miss Winifred Smith were proposed as Fellows.

Mr. Edward Charles Stuart Baker, Mr. Edward Alfred Cockayne, M.A., B.M. (Oxon.), Miss Emmeline Crocker, and Mr. Philippe Levêque de Vilmorin were elected Fellows.

A letter was read from His Excellency Count Wrangel, conveying the thanks of His Majesty Gustaf V. for the address of sympathy adopted in General Meeting of the 19th December, 1907.

Mr. Horace W. Monckton, Treasurer and V.P., exhibited specimens and lantern-slides of leaf-impressions from the Reading Beds, on behalf of himself and Mr. O. A. Shrubsole, F.G.S., who was prevented by illness from being present.

A discussion followed, in which Mr. E. T. Newton, F.R.S. (visitor), Mr. Clement Reid, F.R.S., Dr. D. H. Scott, F.R.S., Sec.L.S., and the Chairman engaged; and Mr. Monckton having replied, a vote of thanks to Mr. Shrubsole for his interesting exhibition of specimens was passed.

The following papers were read:—

1. "Fruits and Seeds from the Pre-Glacial Beds of Britain and the Netherlands." By Clement Reid, F.R.S., F.L.S., and Mrs. Reid.
2. "On a Method of Disintegrating Peat and other Deposits containing Fossil Seeds." By Mrs. E. M. Reid. (Communicated by Clement Reid, F.R.S., F.L.S.)

3. "On a Botanical Expedition to Fokien." By S. T. Dunn, F.L.S.
4. "Alcyonaria from the Indian and Pacific Oceans." (Abstract.) By Miss Ruth M. Harrison. (Communicated by Prof. Gilbert C. Bourne, D.Sc., F.L.S.)

February 20th, 1908.

Lieut.-Col. Prain, C.I.E., LL.D., F.R.S., V.-P., in the Chair.

The Minutes of the General Meeting of the 6th February, 1908, were read and confirmed.

Miss May Evelina Bainbridge, B.Sc., Miss Emmeline Crocker, Mr. William Holmes Burrell, and Mr. James William Oliver were admitted Fellows.

Mr. Hamilton Herbert Charles James Druce, F.Z.S., F.E.S., Mr. Walter Thomas Haydon, and Mr. John Herbert Milton, were proposed as Fellows.

The Vice-President in the Chair announced that there were two vacancies in the list of Foreign Members owing to the death of Prof. Frans Reinhold Kjellman and of Prof. José Vicente Barboza du Bocage.

The Chairman also stated that a celebration of the Jubilee of the presentation of the Darwin-Wallace joint essay on 1st July, 1858, would take place on the 1st July next; the details were not complete, but it was intended that an afternoon meeting and an evening reception should take place on the day named, with the award of copies of a special medal, and subsequent publication of the proceedings of the celebrations. Subscriptions were invited to defray the cost

Mr. T. Ernest Waltham exhibited stereoscopic photographs of Alpine flowers in their natural colours, some of the slides being also shown by means of the lantern on the screen. Mr. R. Morton Middleton, Mr. Arthur W. Sutton, Dr. A. B. Rendle, and the Vice-President in the Chair, made some observations, and Mr. Waltham replied.

The following papers were read:—

1. "Experiments with Wild Types of Tuber-bearing Solanums." By Arthur W. Sutton, F.L.S.
2. "The Life-history and Larval Habits of Tiger-Beetles (Cicindelidæ)." By Dr. V. E. Shelford. (Communicated by the Rev. Canon W. W. Fowler, M.A., F.L.S.)

March 5th, 1908.

Lieut.-Col. PRAIN, C.I.E., LL.D., F.R.S., V.-P., in the Chair.

The Minutes of the General Meeting of the 20th February, 1908, were read and confirmed.

Mr. Hugh Broughton, and Fleet-Surgeon Charles Geekie Matthew, M.B., were proposed as Fellows.

Prof. Otto Bütschli, of Heidelberg, and Prof. Alfred Gabriel Nathorst, of Stockholm, were proposed as Foreign Members.

The Rev. George Henry Aidan Elrington, O.P., D.Sc., Mrs. Marian Sarah Farquharson, Mr. Charles Francis Ullathorne Meek, and Miss Winifred Smith were elected Fellows.

The following papers were read:—

1. "On a possible case of Mimicry in the Common Sole." By Dr. A. T. MASTERMAN, F.L.S.
2. "On the Morphology of *Stigmaria* and of its Appendages in comparison with Recent Lycopodiales." By Prof. F. E. WEISS, D.Sc., F.L.S. (See p. 74.)
3. "On *Trichoniscoides albidus* (Budde-Lund) and *P. sarsi*." By ALEXANDER PATIENCE. (Communicated by Prof. MALCOLM LAURIE, D.Sc., F.L.S.)

March 19th, 1908.

H. W. MONCKTON, Esq., Treasurer & Vice-President, in the Chair.

The Minutes of the General Meeting of the 5th March, 1908, were read and confirmed.

Mr. Henry Haselfoot Haines was admitted a Fellow.

Miss Ethel Louise de Fraine, B.Sc., Mr. George Edward Nicholls, B.Sc., A.R.C.S., and Mr. Richard Williams Harold Row, B.Sc., were proposed as Fellows.

Mr. Hamilton Herbert Charles James Druce, Mr. Walter Thomas Haydon, and Mr. John Herbert Milton were elected Fellows.

The Chairman called upon the General Secretary to read the terms of a circular about to be sent to the Fellows explaining the nature of the Darwin-Wallace Celebration to be held on 1st July next.

The following exhibitions were shown by permission of the Director, Royal Botanic Gardens, Kew:—

(1) Mr. W. Botting Hemsley, F.R.S., F.L.S., sent for exhibition a second specimen of *Platanthera chlorantha* with three spurs, which was described in his absence by Mr. C. H. Wright, A.L.S. The plant now shown came from the Rev. E. A. Woodruffe-Peacock, F.L.S., to whom it had been sent by Miss Susan Allett, of Bath, and exhibited a spike, each flower of which had the three petals spurred, a case of true peloria, whereas the specimen shown on 17th January, 1907, had the three sepals spurred, a case of false peloria.

In consequence of the publication of the latter specimen in the Society's Journal (Botany, vol. xxxviii. (1907) p. 3), Cav. Sommier has drawn attention to the occurrence of true and false peloria in *P. bifolia* in the neighbourhood of Florence.

Dr. A. B. Rendle offered a few remarks on this exhibition.

(2) Mr. T. A. Sprague, F.L.S., showed female flowers and fruits of *Sterculia Alexandri*, Harv., an extremely rare tree from Uitenhage, the only locality known for it, where it was first found in January 1848 by Dr. R. C. Alexander, F.L.S. (afterwards Prior). The specimens shown had been collected by Dr. S. Schönland, F.L.S., who reported that the seeds were of pleasant taste resembling a chestnut, and were greedily sought after and devoured by the baboons.

Discussion was carried on by Mr. A. P. Young, Mr. J. R. Drummond, and Mr. E. M. Holmes, Mr. Sprague replying.

(3) Mr. C. H. Wright, A.L.S., showed specimens of (a) *Sphærothylax algiformis*, Bisch., a rare South-African Podostemaceous plant, and spoke of the outward resemblances of some plants of this family to certain cryptogams, showing side by side examples of *Hydrostachys imbricata*, A. Juss., and *H. nana*, Engl., as resembling the alga *Caulerpa cupressoides*, and *Tristicha hypnoides*, Spreng., with the form of a moss; also (b) *Archangiopteris Henryi*, Christ & Gilsenh., a Chinese genus of Marattiaceæ, of which a better supply of material had been recently obtained.

The discussion on these exhibitions was engaged in by Dr. A. B. Rendle, Mr. J. C. Shenstone, and Dr. D. H. Scott, the latter expressing his concurrence in the view that the genus *Archangiopteris* was very nearly allied to the older genus *Angiopteris*.

The following papers were read:—

1. "The Podosomata of the Temperate Atlantic and Arctic Oceans." By the Rev. Canon A. M. Norman, F.R.S., F.L.S.
2. "Amphipoda Gammaridea from the Indian Ocean, British East Africa, and the Red Sea." By A. O. Walker, F.L.S.

3. "A Revision of the Genus *Codonopsis*." By T. F. Chipp. (Communicated by W. Botting Hemsley, F.R.S., F.L.S.)
4. "The Holothurians of the Sudanese Red Sea." By E. Hindle. (Communicated by the President.)

April 2nd, 1908.

Lieut.-Col. Prain, C.I.E., LL.D., F.R.S., V.-P., in the Chair.

The Minutes of the General Meeting of the 19th March, 1908, were read and confirmed.

Miss Winifred Smith, Mr. Edward Alfred Cockayne, Mr. David Thomas Gwynne-Vaughan, and Mrs. Harriet Isabel Adams were admitted Fellows.

Mr. Charles Aubrey Ealand was proposed as a Fellow.

Mr. Hugh Broughton and Fleet-Surgeon Charles Geekie Matthew were elected Fellows.

The Rev. John Gerard, S.J., F.L.S., exhibited lantern-slides of "Vegetable Imitations or Mimicries," amongst them *Ophrys muscifera* and *O. apifera*, *Veronica tetragona*, once described as a Gymnosperm, and a *Dacrydium* which closely resembles it, and instances from the genus *Lysimachia* which appear to mimic *Paris* and other remote genera by their habit and foliage.

Prof. Dendy, Prof. Weiss, and the Vice-President in the Chair, contributed remarks on the subject.

The following papers were read:—

1. "The Anatomy of some Sapotaceous Seedlings." By Miss Winifred Smith, B.Sc., F.L.S.
2. "Notes on some Sponges recently collected in Scotland." By Dr. Nelson Annandale, F.L.S.

May 7th, 1908.

Prof. W. A. Herdman, D.Sc., F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 2nd April, 1908, were read and confirmed.

Fleet-Surgeon Charles Geekie Matthew, Monsieur Philippe Levêque de Vilmorin, Mr. Hamilton Herbert Charles James Druce, Mr. Reginald Evelyn Child Beale, the Rev. George Henry Aidan Elrington, D.Sc., and Mr. Frederick James Chittenden were admitted Fellows.

Mr. Ernest Melville Cutting, B.A. (Cantab.), Mr. Louis Charles Deverell, F.G.S., Mr. James Montagu Francis Drummond, B.A. (Cantab.), Mr. Cecil Hallworth Treadgold, M.A. (Cantab.), and Miss Grace Wigglesworth, M.Sc. (Manc.), were proposed as Fellows.

Miss Ethel Louise de Fraine, B.Sc., Mr. George Edward Nicholls, B.Sc., A.R.C.S., and Mr. Richard Williams Harold Row, B.Sc., were elected Fellows; and Prof. Otto Bütschli, of Heidelberg, and Prof. Alfred Gabriel Nathorst, of the Naturhistoriska Riksmuseum, Stockholm, Foreign Members.

Prof. J. P. Hill, D.Sc., and Dr. A. B. Rendle, M.A., were proposed as Auditors on behalf of the Council, and Mr. Herbert Druce and Mr. Henry Groves on behalf of the Fellows; and by show of hands were elected Auditors.

The President announced that on 1st July next, the President and Council would entertain the Darwin-Wallace Medallists and Foreign Guests to Dinner at the Princes' Restaurant, and Fellows to a limited number could also purchase tickets, price one guinea, including wine.

Prof. F. E. Weiss, D.Sc., exhibited fruits of the "Buddha's Claw" variety of *Citrus Medica* which he had obtained at Easter from the gardens at La Mortola, formerly belonging to the late Sir Thomas Hanbury, K.C.V.O., F.L.S., also a normal fruit for comparison. M. de Vilmorin commented on the frequent portrayal of this fruit in Japanese art, and also the variety of preserves made from it in China.

Mr. F. Martin Duncan, F.R.P.S., exhibited by means of the Newman fire-proof Kinematograph, a representation of the movements of *Peripatus* and other invertebrate animals. The special feature of the apparatus used was, that it enabled one to analyse all movement, picture by picture, instead of having to run the whole film through from end to end without a stop as in ordinary Kinematograph projectors. The effect of concentrated light upon different species of Invertebrate animals had proved of interest and frequently a difficulty, so that colour filters and isochromatised negative films had in some cases to be used to obtain a satisfactory record.

In reply to the President, the exhibitor explained that he was engaged in study of the complex movements displayed, and hoped at a later period to bring his results before the Society.

The following papers were read:—

1. "Colony-formation as a Factor in Organic Evolution." By H. M. Bernard, M.A. (Communicated by Prof. Dendy, D.Sc., F.R.S., Sec. L.S.)

2. "Antipatharia from the Voyage of H.M.S. 'Sealark.'" By C. Forster Cooper, M.A. (Communicated by J. Stanley Gardiner, M.A., F.R.S., F.L.S.)
3. "Freshwater Fishes, Batrachians, and Reptiles obtained by Mr. J. Stanley Gardiner's Expedition to the Indian Ocean." By G.A.Boulenger,F.R.S. (Communicated by J. Stanley Gardiner, M.A., F.R.S., F.L.S.)
4. "The Madreporarian Corals.—Part I. The Family Fungidæ, with a Revision of its Genera and Species and an Account of the Geographical Distribution." By J. Stanley Gardiner, M.A., F.R.S., F.L.S.

May 25th, 1908.

Anniversary Meeting.

Prof. W. A. Herdman, D.Sc., F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 7th May, 1908, were read and confirmed.

Mr. Herbert Clifton Chadwick was admitted an Associate, and Prof. Seittsiro Ikeno a Foreign Member.

Miss Helen Stuart Chambers, B.Sc., Mr. Norman Gill, and Mr. Henry Herbert Travers were proposed as Fellows.

It was proposed from the Chair on the initiative of the Council that His Majesty Gustaf V., King of Sweden, be elected an Honorary Member, which was done by acclamation.

The Treasurer read his financial statement, which was received and adopted by the Meeting (see p. 15).

The General Secretary's report of deaths, withdrawals, and elections during the past year was read, as follows:—

Since the last Anniversary Meeting 24 Fellows have died or their deaths been ascertained:

Dr. Robert Barnes.
Rev. Richard Baron.
Mr. Edward Alfred Lionel Batters.
Mr. John Benbow.
Sir Dietrich Brandis.
Mr. Robert Ingham Clark.
Mr. John Farrah.
Mr. Charles Anderson Ferrier.
Mr. Frederick Ernest Grant.
Dr. Edward Alfred Heath.
Sir James Hector.
Mr. Joseph Ince.
Dr. Maxwell T. Masters.
Prof. Alfred Newton.
Mr. William Rome.
Mr. Howard Saunders.
Mr. Alexander Somerville
Dr. Henry Clifton Sorby.
Prof. Charles Stewart.
Lieut.-General Sir Richard Strachey.
Mr. William Thomas L. Travers.
Mr. James Herbert Veitch.
Mr. John Francis Walker.
Mr. Charles Augustus Wright.

Receipts and Payments of the Linnean Society from May 1st, 1907, to April 30th, 1908.

Receipts.	£	s.	d.
Balance at Bankers on 1st May, 1907	443	8	10
Interest on Investments	232	6	1
Admission Fees	264	0	0
Annual Contributions	1490	0	0
Compositions	194	0	0
Sales of Publications :—			
Transactions £89 7 4			
Journals 101 6 9			
Proceedings and Catalogues 11 8 0			
	202	2	1
Miscellaneous Receipts	20	16	1
Donations in aid of Publications	200	0	0
Subscriptions to the Darwin-Wallace Celebration	167	14	0
	£3214	7	1

Payments.	£	s.	d.
Taxes and Insurance	10	18	9
Repairs and Furniture	71	11	0
Coals, Electric Current and Gas	52	7	7
Salaries	757	0	0
Library :—			
Books £214 10 5			
Binding 108 14 10			
	323	5	3
Expenses of Publications :—			
Printing £709 8 1			
Illustrations 306 13 6			
Distribution 53 3 3			
	1069	4	10
Miscellaneous Printing and Stationery	128	12	11
Petty Expenses (including Tea and Postage)	194	6	4
Investment of Compositions	180	15	0
Balance at Bankers, 30th April, 1908	426	5	5
	£3214	7	1

Investments on April 30th, 1908.

	£	s.	d.		£	s.	d.
Metropolitan 3½ per cent.	1079	11	3	@ 102	1101	3	1
Great Indian Peninsula Railway, Annuity Class B	42	1	5	@ 21	883	9	9
Forth Bridge Railway 4 per cent. Stock	450	0	0	@ 111	499	10	0
Metropolitan 3 per cent.	1000	0	0	@ 93	930	0	0
India 3 per cent.	700	0	0	@ 91¼	638	15	0
Metropolitan Water Board 3 per cent. Stock "B" (Westwood Bequest)	232	5	0	@ 91	211	6	11
Eastern Bengal Railway 4 per cent. Debenture Stock	1000	0	0	@ 113	1130	0	0
Great Western Railway 4 per cent. ,, ,,	1000	0	0	@ 117½	1175	0	0
				HORACE W. MONCKTON, *Treasurer.*	£6569	4	9

We have (in conjunction with the Professional Auditor, who certifies as to all details) audited the Accounts of the Society for the year ended 30th April, 1908, and found them correct.

HERBERT DRUCE,
ALFRED B. RENDLE,
HENRY GROVES,
JAMES P. HILL,
B. DAYDON JACKSON,
Auditors.

W. B. KEEN, *Chartered Accountant.*

ASSOCIATE (1).

Mr. Frederic Moore.

FOREIGN MEMBERS (2).

Prof. José Vicente Barboza du Bocage.
Prof. Karl Möbius.

The following 6 Fellows have withdrawn:

Mr. William Henry Blaber.
Mr. Frederick James Faraday.
Mr. James Scott Gordon.
Mr. Ernest Charles Horrell.
Rev. Richard Paget Murray.
Dr. Charles Symes.

Mr. Henry Williams and Mr. George Sampson V. Wills have been removed from the List of Fellows, under the provisions of the Bye-Laws, Chapter II. Section 6.

Fifty Fellows have been elected (of whom 47 have qualified), and one Associate.

The Librarian's report was then laid before the Meeting as follows:—

During the past year, 94 volumes and 120 pamphlets have been received as Donations from Private Individuals.

From the various Universities, Academies, and Scientific Societies 323 volumes and 205 detached parts have been received in exchange and otherwise, besides 68 volumes and 24 parts obtained by exchange and as Donations from the Editors and Proprietors of independent Periodicals.

The Council have sanctioned the purchase of 178 volumes and 89 parts of important works.

The total additions to the Library are therefore 663 volumes and 508 pamphlets and separate parts.

The number of books bound during the year is as follows:—

In full morocco 5 volumes, in half-morocco 355 volumes, in half-calf 4 volumes, in full cloth 142 volumes, in vellum 23 volumes, in buckram 52 volumes, in boards or half-cloth 25 volumes, relabelled (half-morocco and cloth backs) 55 volumes. Total 661 volumes.

The General Secretary having read the Bye-Laws governing the elections, the President opened the business of the day, and the Fellows present proceeded to vote.

The President then delivered his Annual Address as follows:—

PRESIDENTIAL ADDRESS.

FELLOWS OF THE LINNEAN SOCIETY,—

It is with feelings of regret, of relief and of gratitude that I rise to address you for the last time from this Chair. I regret deeply to sever my official connection with the Society, and yet I own to a certain sense of relief that I have served my time and shall now be free to return to those excursions into the unknown which are the chief business of a scientific man and which are less wearing and perhaps more profitable in the end than fortnightly excursions to London. Pleasant as my work here has been, it is no light responsibility for one like myself, engaged in active professional work more than 200 miles away, to undertake for four years the duty of occupying the Presidential Chair of such a Society as this. My dominant feeling, however, is one of gratitude—both to the Fellows for having given me this opportunity of serving them, and to my fellow Officers for their constant kindness and most efficient support. I ought to acknowledge especially the consideration shown to me during my recent absence for two months in the Gulf of Manaar, when the Treasurer relieved me from my duties on Council and Colonel Prain and the other Vice-Presidents took my place in this Chair at the evening meetings.

I congratulate the Society on having elected as my successor that most eminent Botanist, and most genial of colleagues, Dr. D. H. Scott, F.R.S., and I congratulate Dr. Scott on having attained to the highest honour we can bestow on our Officers in the Society. Dr. Scott's elevation to the Chair causes a vacancy in the secretariat, and we are fortunate in having now selected Dr. Stapf as our Botanical Secretary. Occasional changes in the Executive are inevitable, and they have perhaps been unusually frequent during the last few years, but we have only the happiest feelings and anticipations in regard to the appointments made to-day. That the Linnean Society may increase and prosper in all good works, under the guidance of your new Officers, is the earnest hope of your retiring President.

We know, as Anthropologists, that it has been the custom in some countries to put the king, chief, or high priest to death while he is still in full vigour, bodily and mental, hoping thereby to pass on his strength and spirit to his successor unimpaired by decay. In some cases the practice permitted the chief to reign only for a fixed period, at the conclusion of which he was inexorably led to the sacrificial altar.

You, in your wisdom, have adopted the same principle. You recognise that the occupation of this Chair for more than four years might lead to a deterioration in the active spirit which you rightly demand should animate the head of our Society; but more merciful than the early Aryan tribes, who required that their leader should

be slain at a great meeting when his term of office had expired, you permit him to retire with his life into the obscurity from which you raised him—so long as he is able to hand on the work and the tradition of the Society unimpaired to his successor, and the only sacrifice you demand is that he should render some account of his time by addressing you upon the affairs of the Society, and upon some aspect of one or other of those sciences which you cultivate.

I have been privileged to occupy this Chair during a most interesting period in the history of the Society. In the first of these four sessions (1904–5) the Fellows adopted the new code of bye-laws, and as a result the Fellowship of the Society was thrown open to duly qualified scientific women on equal terms with men. In all, 41 such women have now been elected; and of these, six have read papers while others have taken part in our discussions, and one (Miss Sargant) has served on Council and Committees. The added gain and strength to the Society is recognised and appreciated by us all.

In all, about 150 new Fellows have been elected in the four years, and 100 have died or resigned during the same period; so the Society is growing, although not so rapidly as some of us would wish. This is a Society to which all active original workers in Biology should desire to belong, and the more experience I have of its meetings the more I am impressed with the value of that association and co-operation of Botanists and Zoologists which we still enjoy but which has been lost in many Natural History Societies and in the Sections of the British Association.

The work brought before us during the last four years has been large in amount and seems to be increasing. No less than 52 papers have been communicated during the present session. A considerable number of those papers have come to this Society as the result of the arrangement made with the Trustees of the Percy Sladen Memorial, whereby we have undertaken to publish the Reports of the First Percy Sladen Expedition in a series of six large volumes—to meet the expenses of which the Trust contributes largely. Of the first volume three parts have already appeared, and the fourth is now in our Secretaries' hands and will be out before long.

The Society is also publishing in the Zoological Journal a series of reports upon the collections made by Mr. Cyril Crossland on the Sudanese coast of the Red Sea—a coral region of considerable faunistic interest. Amongst other papers of special interest this session the following have given rise to important discussions:—Dr. Archdall Reid's "Mendelism and Sex," Mr. A. W. Sutton's "Brassica Crosses" and "Tuber-bearing Solanums," and Mr. Clement Reid's "Preglacial Fruits and Seeds."

Our loss by death among the older Fellows has been unusually severe, including as it does such notable veterans of science as Professor Newton, Dr. Masters, Professor Charles Stewart, Mr. Howard Saunders, Sir James Hector, Sir Richard Strachey, and Dr. Sorby.

The usual obituary notices of the deceased Fellows will be laid upon the table by the Secretaries.

During this session we have lost by death two of our Foreign Members, Prof. Barboza du Bocage of Lisbon, and Prof. Karl Möbius of Berlin. Two additional Foreign Members have also been elected, Prof. Nathorst of Stockholm and Prof. Bütschli of Heidelberg. Your election today of H.M. the King of Sweden as an Honorary Member fills the place left by the death of the late King Oscar II., and perpetuates in the happiest manner the traditional and sympathetic connection which has long existed between this Society and the country of Linnæus.

The death of Mr. Frederic Moore, A.L.S., left a vacancy in the ranks of our Associates which the Society worthily filled by the election on December 19th of Mr. H. C. Chadwick, Curator of the Port Erin Biological Station. The Council has awarded the Linnean medal this year to our former Zoological Secretary and honoured colleague, the Rev. Thomas R. R. Stebbing, F.R.S., than whom there could be no more worthy recipient.

During last session we, in common with similar societies in Sweden and elsewhere, celebrated the 200th Anniversary of the birth of Linnæus. In addition to the references to the occasion made at our last Anniversary meeting, and to our participation in the primary celebrations at Upsala and Stockholm, we held an evening reception in these rooms on June 7th, which was largely attended by our Fellows and their friends and by many distinguished guests, including the Swedish Minister and a number of eminent men of Science. On this occasion there were exhibits of scientific interest—both Linnean and others—in the Library upstairs, while short addresses and illustrated lectures were delivered in this meeting room at intervals. The success of this conversazione was undoubted, and frequently during that evening, and also since, have our Fellows spoken to me in high appreciation of the form which our Linnean celebration had taken, and some indeed expressed the hope that another occasion of meeting with so much of scientific interest to see, hear and talk about would soon be provided.

The approaching celebration of the Jubilee of the Darwin-Wallace communication to this Society on 1st July, 1858, seems likely to provide such an occasion. A special Committee of Council is engaged in arranging the programme and other details, and a preliminary circular has been issued showing that the celebration will consist of :—

(1) An afternoon meeting for the delivery of appropriate addresses and the award of special medals to Dr. Alfred Russel Wallace, Sir Joseph Hooker and others.
(2) A dinner of the Fellows, the Medallists and other Guests.
(3) An evening reception in these rooms ; and
(4) The publication of a volume containing an account of the ever memorable meeting of July 1st, 1858, and of these Jubilee proceedings.

The last address which I delivered to you from this Chair dealt with the principles underlying the organisation of Fishery Research in this country, and with the methods of investigation of that floating life of the ocean which is of enormous importance in connection with the food supply from the sea.

The method has been adopted by Naturalists and Oceanographers of taking samples of this floating life or plankton with fine silk nets of known straining capacity, the hypothesis being that if we know the contents of a small sample of water we can calculate the living contents of the ocean. It is obvious that this hypothesis rests upon the assumption that the organisms in questions are distributed with such uniformity that small samples of the water are representative of the whole. I have devoted all my spare time for the last couple of years to work at sea with various kinds of closing and open tow-nets designed for the purpose of testing this assumption. What I laid before you last year was of the nature of a preliminary announcement giving the first impressions received from observation of the catches. Since then, however, the six or seven hundred gatherings which I took from the yacht 'Ladybird' in the seas around the Isle of Man during the year 1907 have all been exhaustively examined by our Associate, Mr. Andrew Scott; and from his lists and my own observations I have drawn some arguments and conclusions *, with a few of which I propose to trouble you.

First, as to the data:—We have nearly 900 gatherings taken in the year 1907 in the northern portion of the Irish Sea, and of these about 650 are from a limited area in the immediate neighbourhood of Port Erin. At the south end of the Isle of Man, where these gatherings were taken, there are very important fishing grounds which are frequented by trawlers from Lancashire and from Ireland, as well as by the Manx fishermen. This, as well as the circumstance that we have there, within a few miles, a sheltered sandy bay, an exposed rocky coast, a narrow strait through which strong tides run and an area of open sea with depths reaching to 70–80 fathoms, has led me to consider Port Erin a very suitable locality for a thoroughly exhaustive or intensive study of the Marine Plankton.

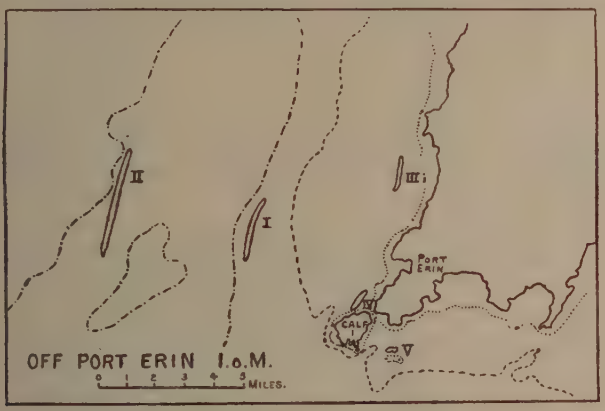
I think it desirable to point out here that the sea off Port Erin cannot be regarded as an exceptional locality. The narrow strait known as the Calf Sound (IV on map opposite) where the tidal currents run with great velocity is, no doubt, exceptional in some respects; but the open sea, 5 to 10 miles off land (I and II on map), has no physical peculiarities such as would lead us to expect any unusual distribution of organisms.

It may be useful to repeat here the same little map that I used last year in order to show the localities at which the gatherings were taken. The nets used, it will be remembered, were:—Two

* A detailed account of the results upon which these conclusions are based will be [and since this was written has been] published in the Lancashire Sea-Fisheries Laboratory Report for 1907 (Trans. Liverpool Biol. Soc. vol. xxii.).

closing vertical nets, the Nansen and the Petersen-Hensen, a weighted and two surface, open, horizontal tow-nets, all made of No. 20 bolting-silk ; and in addition a coarser silk tow-net (No. 6 silk) and a large-meshed shear-net only used occasionally.

During the present Easter vacation (April 11th to 29th, inclusive) I have taken 186 additional gatherings, in 15 working days (an average of over 12 per day), which will serve to compare with those taken during the corresponding period of 1907. The number of Diatoms does not appear to be so great this year as in 1907. The spring maximum does not reach to such a height and



is certainly later in April than was the case last year. I have as yet only the volumes of the catches before me, the numbers of the different organisms present in each net have not yet been calculated. The monthly average in cubic centimetres for the first four months of the year 1908 is as follows :—January 0·8 ; February 0·6 ; March 1·8 ; April 7·4, showing an increase in March which became still more marked in April, but is small compared with that in 1907. The average haul during April, 1908, with the different nets used is :—

Hensen.	Nansen.	Surface (No. 20).	Surface (No. 6).	Weight-net.	Surface (Bay).	Shear.
0·6	1·42	2·77	3·45	4·18	5·5	15

Showing much the same proportions between the nets as in the previous year, but smaller numbers throughout.

I now turn to the conclusions to be drawn from a study of the detailed figures for 1907. It is clear that many of the great seasonal variations in the plankton are not due to changes in the sea-water such as are recognised in hydrographic observations, but are caused simply by the normal sequence of stages in the life-histories of organisms throughout the year. No amount of

"hydrographic" change in the water will determine the presence of Echinoderm larvæ at a time of year when they are not produced, nor of Crab Megalopas when they do not naturally occur.

Three factors, at least, contribute to the constitution of the plankton from day to day throughout the year:—

(1) The sequence and periodicity of stages in the life-history of the organisms;
(2) Irregularities due to the inter-action of organisms, as when one group serves as the food of another;
(3) Periodic changes and abnormalities of either time or abundance caused by the nature of the sea-water or by weather conditions which may either determine or prevent the normal or permit of an abnormal development of certain species.

The appearance of swarms of Balanoid Nauplii, followed after an interval by the "Cypris" stage, is an example that comes under the first head. The disappearance of Diatoms when used as food by the increasing swarms of Copepoda and other Crustacea, both larval and adult, and of the Copepoda in turn when eaten by the developing post-larval fish, are changes falling under the second head. The great increase in the number of Diatoms in spring when the physical condition of the sea-water has become favourable, the enormous development of Dinoflagellates which may take place suddenly in autumn under unusual weather conditions, the almost total suppression of a group such as the Medusæ in some localities in an unusually stormy summer, and the immigration of a species or a group of species from the open ocean or from a neighbouring sea-area as the result of variations in the hydrographic conditions, are all examples that may be classed in the third category.

Two or all of these factors may, however, be at work together, and so the explanation of any particular change may be a very complicated problem. The increased development of a group, or the immigration of a species, may so disturb the balance of nature as to be followed by unusual changes in other groups.

The results of the hauls obtained on April 9th and 10th in Port Erin Bay are good examples of a local plankton mainly composed of Diatoms. It is noticed in running the eye down the groups that whereas the Diatoms occur in thousands extending up to even 100,000, the Dinoflagellates are in hundreds, extending, at most, to a thousand; the Copepoda are in tens, rarely reaching a hundred or two, while the fish-eggs are scattered units, such as 1 and 2. The general character of the hauls on April 9th is that there are ten times as many Copepods as fish-eggs; ten times as many Dinoflagellates as Copepods, and ten times as many Diatoms as Dinoflagellates, per species. On the following day, April 10th, the proportions are somewhat the same; and if we pick out the largest numbers recorded in each of these groups, these

may be described in the case of each day as units, hundreds thousands, and tens of thousands—or thereabouts.

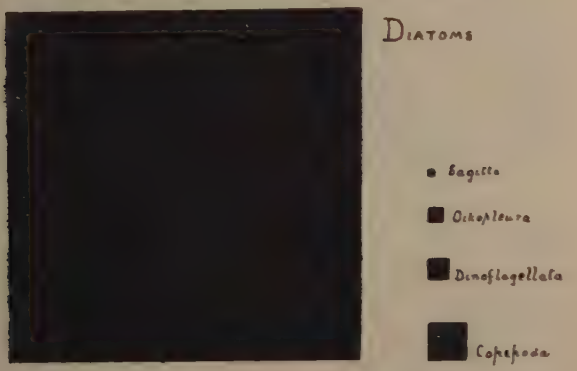
	Diatoms.	Dinoflagellates.	Copepoda.	Fish-Eggs.
April 9	100,000	1000	250	2
April 10	90,000	2000	780	8

As another example of the same run of figures in these groups we note that in a surface haul, W. of the Calf Island, on March 29th, the total

Diatoms amount to	.....	72,650
Dinoflagellates	,, ...	3,500
Copepoda	,, ...	363
Fish-Eggs	,, ...	93

Generally speaking these proportions hold good for many of the series of hauls not only in the Bay, but also from the open sea outside. Fig. 1 shows by the proportions of the squares the

Fig. 1.—Diagram showing maximum haul in the year.



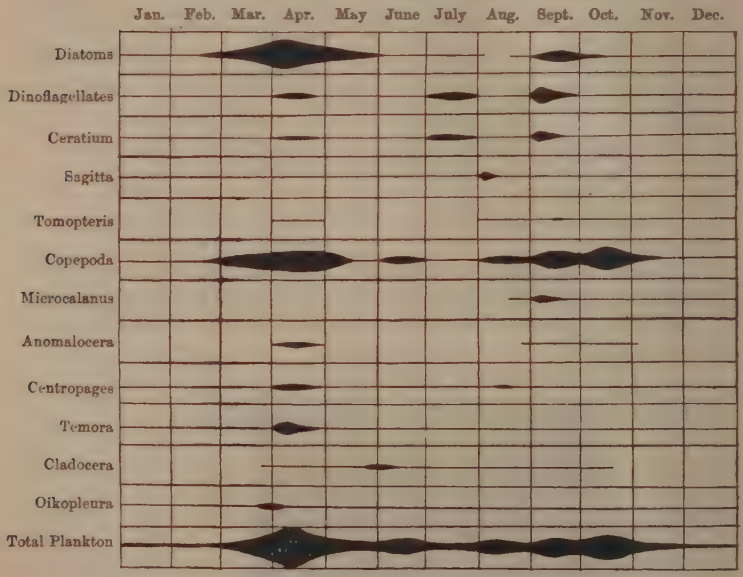
numbers contained in the greatest hauls of Diatoms, Copepods, Dinoflagellata, Oikopleura, and Sagitta, respectively.

Lists compiled from the gatherings and curves drawn from these lists show that, as a consequence of the three factors noted above, certain groups and certain prominent species differ from one another greatly in their relative abundance throughout the months of the year (see fig. 2, p. 24).

Thus, the Diatoms take on an enormous development in early spring, and reach their maximum in April, then die down during the summer, and may rise again to a second but much less important and less constant maximum in autumn (fig. 3, p. 24). It must be borne in mind, however, that the species, and to some

extent the genera, that form the autumn increase (*Chætoceros subtile* and species of *Rhizosolenia*) are quite different from those

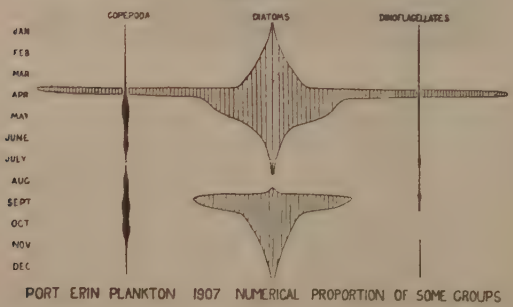
Fig. 2.—Distribution throughout the year—diagrammatic.



present in spring (e.g., *Chætoceros contortum*, and species of *Thalassiosira*).

From the list of the total plankton throughout the year, reduced

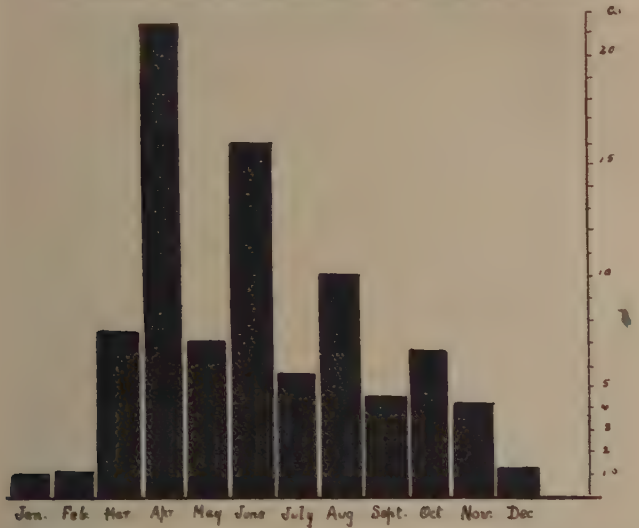
Fig. 3.



to the average per net per day, it is seen that the greatest bulk of plankton in the water is in April, when the total catches in the

day reached an average of 51 c.c. per haul. Other lesser elevations are seen in June with 20 c.c., and August with 25 c.c. The catch in some individual hauls runs a great deal higher than these averages, the top score being the Nansen net on April 4th, with 164·5 c.c. Fig. 4, showing the average haul of plankton per

Fig. 4.—Diagram showing average haul of Plankton per month.



month, brings out the great range and remarkable diversity between adjacent months.

The spring maximum in the amount of the plankton is clearly due to a great and sudden increase in the amount of Diatoms present (see fig. 3). The other rises seen later in the year, as in June, August, and to a slighter extent in October, are less marked, and are less clearly due to one cause.

The hauls taken on an off-shore station, on April 5th, show the condition of affairs during the spring maximum of the Diatoms, when 14 millions of one species, *Chætoceros contortum*, were present in one haul of the Nansen net. The total number of Diatoms in that haul was nearly 17 millions, including two millions of *Thalassiosira Nordenskioldii*. Comparatively few Copepoda and other organisms were present. The two surface gatherings of this date were moderately alike, the same organisms were present in both, although one net had, in some cases, about twice as many as the other: but still the hauls were of the same general type and the quantities were, in most cases, not very different, showing that one can get a good general idea of the fauna by such hauls, but that one cannot depend upon their being minutely representative.

They may show something like double or half the quantity of organisms obtained in neighbouring hauls.

For comparison with such gatherings, we may examine the similar series of hauls taken late in August from about the same locality. On August 21st there are practically no Diatoms present, there being only a very few individuals of *Biddulphia mobiliensis*. On the other hand, the Copepoda are much more abundant than they were in April. For example, compare *Oithona similis*, where only tens, amounting at most to a few hundreds, were present in April, and thousands (reaching eleven thousand in the weighted net) were in the August haul. Other interesting differences can be noticed on comparing the two lists in detail.

The Copepoda have two maxima in the year, the first in April and the second in September and October. The records start in January with about 2000 per haul and keep below that level throughout February and most of March. During April they rapidly mount up with a series of successively higher records, with falls between, such as April 2nd 4,500, April 13th 10,755, April 16th 11,600, till the climax is reached on April 27th with 29,825. During May the numbers are low, 1,045 to 6,505; in June they rise somewhat, 13,610 on the 11th and 15,450 on the 27th, falling again in July to numbers between 2,895 and 7,930. August shows a series of rises with falls between, the tops being 18,200 on the 10th, 19,400 on the 14th, 14,700 on the 15th, 16,915 on the 24th, and 10,970 on the 29th. September begins at a low level, reaches 11,942 on the 4th, and, with falls between, 27,177 on the 12th, 13,440 on the 20th, and 27,312 on the 20th, followed by 10,582 on 21st, 18,450 on 23rd, 11,850 on 24th, and 12,110 on 30th. October is also high, with 16,973 on the 9th, 27,790 on 14th, and 24,480 on 24th. November shows one high figure, 10,937 on the 8th; while December ranges from 1,724 to 2,755; the year's record ending very much at the same level where it commenced in January. The range in number of the Copepoda per net, 30 to 29,800, is considerable compared with that of some groups, but does not equal that of the Diatoms.

The monthly averages of the Copepoda during this year are as follows:—

Jan.	1,816	July	5,462
Feb.	793	Aug.	5,496
Mar.	1,379	Sept.	6,514
Apr.	5,858	Oct.	17,572
May	3,415	Nov.	6,923
June	12,138	Dec.	2,289

The highest averages here (June and October) do not quite coincide with the maxima (April and September–October) in the previous treatment where the days were taken singly. The explanation is, of course, that although April contains a maximum far above that of June, it also contains in the earlier part of the month many low records that pull down the average when the month is treated as a whole. The maxima in high average bulk of

catch extending over the month, but not in exceptional catches, are seen from this list to be in June and October, and especially in the latter.

If we look now for the largest individual hauls of a single species of Copepod we find that they occur in April, August, and September. The following are some of the more important of these :—

April	9—Pseudocalanus elongatus	16,000
	9—Temora longicornis	19,000
	23—Calanus helgolandicus	13,480
	24—Acartia clausi	28,000
Aug.	13—Oithona similis	14,000
	17— „ „	25,000
	24—Acartia clausi	29,000
	27— „ „	24,700
	29—Pseudocalanus elongatus	23,000
Sept.	4—Acartia clausi	23,600
	4—Pseudocalanus elongatus	36,000
	12— „ „	33,600
	18— „ „	25,000
	20—Oithona similis	29,270

These also bear out the idea of maxima in April and in autumn, the latter being the more important one ; in both cases they follow the phytoplankton. As a rule a haul rich in Copepoda has few Diatoms, and *vice versâ*, but the Copepoda do not, like the Diatoms, present great maxima and marked depressions. Even when both groups are present in the plankton we frequently find that they are in different zones ; for example, in some April hauls in 1907 the Diatoms were markedly on the surface and the Copepoda below, while later in the year these positions were reversed.

The distribution of particular Copepoda (*Calanus*, *Anomalocera*, *Microcalanus*, *Pseudocalanus*, *Centropages*, *Temora*) have been followed separately and form interesting studies. *Calanus*, *Pseudocalanus*, *Centropages*, and *Temora* are present throughout the year ; *Anomalocera* appears in our district in spring ; *Microcalanus* in late autumn.

The Diatom fauna makes its appearance again in September (fig. 3). The two surface-nets on Sept. 12th show very large numbers of Diatoms, extending up to 13 millions and 16 millions in single hauls in the case of *Rhizosolenia semispina*—in fact this highest peak in the September maximum of Diatoms is mainly composed of this one species of *Rhizosolenia*, whereas in the spring maximum the bulk of the catch is made up of *Chætoceros contortum* and *Thalassiosira Nordenskioldii*, species that are rare or altogether absent in September gatherings. The genus *Thalassiosira* is mainly a spring form, rarely present after May, and is not represented in autumn in this year's results.

When a comparison is made between the three similar open tow-nets which were worked together for 15 minutes at a time—two at or close to the surface, and the other weighted so that it was lowered to a depth of about ten fathoms, and gradually rose, as the boat went slowly ahead, to a depth of a foot or two below the surface—it is almost invariably found that the weighted net,

with its wider range through the deeper layers of water, gave a larger and sometimes a much larger quantity of organisms. The only exceptions to this rule are on some occasions in April, when the sea was full of Diatoms and the surface-nets gave very large hauls, equal to or even exceeding the deeper ones. But even during the Diatom maximum in April some days showed more in the weighted than in the surface-nets. For example, on April 10th, at along-shore station III, the surface gave 11·5 and the net at one fathom 19·5 c.c., and the total Diatoms were 27,000 in the former and 188,000 in the latter.

In some cases, as I showed last year, the two similar surface-nets worked together gave dissimilar results. Even when the results are very much alike quantitatively, they may be very different qualitatively; and it is by no means always the two hauls that are most alike in bulk that agree best in the kind and number of organisms. It will probably be agreed that it is unlikely that, with the large, varied and irregularly scattered population that we find the sea to contain, two nets should often catch the same quantities of the same sets of organisms. Consequently a result like that obtained on April 22nd, where the two nets caught precisely the same amounts and where the lists of organisms constituting the hauls are almost exactly alike both in kinds and numbers, is interesting.

On considering the Diatom list, some other points come out:— The average number of Diatoms per catch often varies considerably from day to day. Thus on April 5th the average of all catches of that day was 3,533,800, while on April 6th it fell to 348,750; on April 24th it was 191,873, while on April 25th it was only 663.

But these numbers scarcely give an adequate idea of the quantitative variation among individual catches. Thus on September 10th surface-nets A and B contained 250 and 550 respectively, while two days later the corresponding numbers were 13,495,500 and 16,300,500; on April 8th two hauls of the Nansen net gave respectively 198,000 and 3,739,000, and many other such cases could be quoted.

A general inspection of an unsmoothed curve drawn from the list of Diatom hauls within Port Erin Bay, shows a well-marked maximum at the end of March and earlier part of April. The marked increase of Diatoms, and also of Copepod Nauplii, towards the end of March is seen well in the following three surface hauls:—

	March 26. 12 c.c.	March 27. 14·5 c.c.	March 29. 18·5 c.c.
Total Diatoms =	220,000 ...	277,000 ...	326,000
Biddulphia mobiliensis	46,000 ...	50,000 ...	58,000
Chætoceros debile	6,000 ...	8,000 ...	10,000
„ decipiens	100,000 ...	150,000 ...	160,000
Coscinodiscus concinnus	64,000 ...	67,000 ...	75,000
Copepod Nauplii	7,000 ...	27,000 ...	35,000

There is also an autumn maximum in the Bay showing a very

high peak at the end of September. Omitting, however, the single catch of September 30th (which is due in the main to *Rhizosolenia semispina*) the peak is reduced to less than one-third its former height. A remarkable feature of this September hump is the sudden character of its appearance and disappearance and its short duration (six days). An inspection of the temperature curve of the year for the water of the Bay, shows that the sudden increase in the phytoplankton coincided with the maximum in temperature; and our weekly weather records at the Biological Station show at that same time a week of fine calm weather with easterly breezes (S.E. and E.S.E.). I have noticed the same phenomenon in previous years, both at Port Erin and on the west coast of Scotland, which seems to indicate that if weather conditions be suitable at the end of autumn the phytoplankton may suddenly increase so as to constitute a second maximum in the year, the first being in spring; but that this possible "maximum" may be so modified in time and in amount by temperature and wind as to be unrecognisable. In 1906 it was very much more marked at Port Erin than in 1907, and lasted longer.

The phytoplankton minimum for the bay occurs in August, no Diatoms being taken from August 9th to August 23rd, though nettings were taken on all days included between these dates save three.

As an example of a sudden change in the plankton, we may compare the surface hauls taken in the bay on October 1st and 14th. The total quantities of the two gatherings were 1·5 and 11·5 respectively; on the 1st, Diatoms were relatively abundant (over 91,000); by the 14th they had disappeared. But *Sagitta* and various larvæ, and especially Copepoda, had greatly increased in number by the latter date. The adult Copepoda in all numbered only 1,045 on the 1st, while they reached 27,790 by the 14th; younger forms and Nauplii had also become much more abundant. By November, however, the Diatoms were back in quantity, and Copepoda had begun to decrease again.

The Dinoflagellata rise to a maximum in April later than the Diatoms, and may have a second period of sudden increase in the autumn if weather conditions are favourable.

Ceratium tripos is the most abundant species of Dinoflagellate in the Irish Sea, and is present practically all the year round in considerable abundance (up to 7753 per haul) at the Isle of Man. Our 650 gatherings in one year showed *C. tripos* on 492 occasions.

The curve for *Ceratium tripos* agrees in general with that for the total Dinoflagellates, but differs markedly from those both of Diatoms and Copepoda. The spring maximum in the Dinoflagellates is later than that of the Diatoms, but precedes that of the Copepoda. Then again the September hump of the Dinoflagellates is earlier than that of the Diatoms, and much earlier than the October maximum of Copepoda. On the whole the annual curve for the Dinoflagellates lies intermediate between those for Diatoms and Copepoda.

Sagitta is present throughout the year; it is most abundant in August, and the minimum occurs in winter (January to March).

As showing the difference produced by a larger net of wider mesh, we find that during April, when the hauls with the ordinary tow-nets were giving units and tens, those taken at the same time with the shear-net ran into hundreds, as follows:—360, 123, 286, 310, 200, 200, 400, 400, 300, 800. The fact, however, that the weighted tow-net, not invariably, but usually, took a much larger number than the similar surface-nets, shows that *Sagitta* is usually more abundant in a zone of water below the surface, extending down to 10 fathoms, and that consequently the much greater numbers obtained by the shear-net may be due not wholly to the size of the net and mesh but in part to the depth at which it was worked.

The Nauplius and Cypris stages of *Balanus* form an interesting study. The adult Barnacles are present in enormous abundance on the rocks of Bradda Head, and they reproduce in winter, at the beginning of the year. The Nauplii first appeared in 1907 in the bay gatherings on February 22nd, and increased with ups and downs to their maximum on April 15th, and then decreased until their disappearance on April 26th. None were taken at any other time of the year. The "Cypris" stage follows on after the Nauplius. It is first taken in the bay on April 6th, rises to its maximum on the same day with the Nauplii, and was last caught on May 24th. Throughout, the "Cypris" curve keeps below that of the Nauplius, the maxima being 1,740 and 10,500 respectively. Probably the difference between the two curves represents the death-rate of the Balani during the Nauplius stage.

The two large Copepoda *Calanus helgolandicus* (Claus) and *Anomalocera pattersoni*, Temp., are both regarded as "oceanic" species, and are both present in fair abundance in the Irish Sea. They are two of the most conspicuous objects in our plankton gatherings, and can readily be picked out with the eye and counted.

Calanus was present in our gatherings in 1907 during every month of the year from January 8th to December 30th. It was represented on nearly every occasion when hauls were taken, and in some cases when absent from one net it was taken in another gathering made on the same day, showing that the apparent absence was due either to irregular distribution or to some imperfection in the sampling of the sea. When, then, we find that a species like this is not recorded from a particular haul at a time of year when gatherings are being taken once a week only, one is inclined to suspect from the appearance of the records at other times when the observations were more frequent, that if another haul had been taken that day or on an adjoining day the species would have been represented.

Anomalocera, on the other hand, first appears in our records on March 29th, and then only in the form of metanauplii (100, 170, and 30 in surface hauls off the Calf Island). It continues to be represented, in small numbers, by both adults and young, throughout August and September, and finally on November 8th.

The distribution of *Microcalanus pusillus*, G. O. Sars, throughout the year is interesting. It appears for the first time in our records late in August, and remains fairly constantly present but never very abundant throughout the autumn until January, when it disappears. During the first few weeks it is only in the offshore hauls, appearing first out in mid-channel on August 24th in the Hensen and Nansen nets that were let down to 60 fathoms and hauled up vertically. As specimens were present in all the nets that were closed when they had been pulled up to 45 fathoms, and were not present in the surface and other nets used above this level, it is evident that this Copepod was on its first appearance only in the deep water in mid-channel. It was encountered next on August 26th, in the weighted net hauled at 10 fathoms, on the inner edge of the Train bank, some eight miles off land. On August 31st it made its appearance at Station I in the Hensen and Nansen nets hauled up from 24 fathoms, and in the weighted net from 10 fathoms—the latter having 350 specimens. It was also present on September 2nd and 3rd, under the same circumstances. On September 4th we again found it in mid-channel in the vertical nets which had been down to 60 fathoms ; it was still not present in the surface-nets nor in the inshore waters.

On September 6th, *Microcalanus* appeared for the first time inshore, at Station IV, off the Calf Island, but only in the Hensen and Nansen nets which had been closed at 8 and 15 fathoms respectively ; it was not present in the surface hauls taken at the same time. It was next met with on September 11th, at Station V, south of Calf Sound, inside the Wart Bank, when 100 specimens were taken in each of the two surface-nets, 150 in the weighted net at 10 fathoms, and 5, 5, 5, 3, in the four vertical nets (2 Hensen and 2 Nansen) hauled from 20 up to 10 fathoms. It had evidently become distributed by this time all through the water around the Calf Island. The following day, the species was present in nearly all the numerous nets worked at various depths down to 60 fathoms in mid-channel ; and it then reached its climax in numbers, 2000 in the net at 10 fathoms and 2500 in an open tow-net attached to the shear-net at 20 fathoms. Finally, on September 21st *Microcalanus* turned up for the first time in the surface gatherings taken across Port Erin Bay. It was present in these bay gatherings on October 1st (35) and 24th (100), November 8th (100), December 20th (80) and 23rd (50), and finally January 8th (50 specimens).

This record looks like the immigration of an oceanic species in summer up the deep water of the mid-channel between the Isle of Man and Ireland, and then its gradual spread in late autumn into the shallower inshore waters and finally to the surface of the bay, where it remained throughout the winter.

Centropages hamatus (Lilljeborg) occurs in the Irish Sea all the year round. It is on our records for 1907 in every month, and is practically continuously present from January 8th to December 30th. The numbers are low at the beginning of the year, but reach 600 in one haul of the surface-net by April 9th, and 1300

on April 24th. Contrary to the usual rule, this species seems more abundant on the surface than deeper.

Temora longicornis (Müll.) occurs the whole year round from January to December, attains to high numbers in early spring, and remains fairly abundant into late autumn. It reaches close on 7000 in one haul on April 1st, and 19,000 on April 9th; and shows 1280 and 1600 up to the 23rd of September. *Temora longicornis* seems to be equally abundant inside the bay and in the open sea, on the surface and in the deeper waters. Sometimes the large numbers are in the surface-nets, and at other times in the weighted net from below. This is one of the species that congregates in swarms, and so is occasionally caught in unusually large numbers. Of four similar hauls taken across Port Erin Bay on April 13th, the first two gave 875 and 620 and the last two 1550 and 3700 specimens of *Temora*. On the same date three hauls (two surface and one deeper) taken outside (Station III) gave 800, 850 and 900 specimens, which seems to indicate an even distribution, but half an hour later a couple of miles away the same two surface-nets gave 2400 and 4750 specimens; and moreover in this last case nearly all the *Temora* in the 2400 were young, while in the second net the 4750 were all adults, indicating a segregation of the stages in swarms.

A set of hauls were taken at the end of August on Station V, inside the Wart Bank. One remarkable feature of this occasion was that the Hensen net hauled up from 14 fathoms contained 150 specimens of what is probably a new species of *Leptopsyllus*, while the Nansen net used at the same time, and at the same depth, on the other side of the ship, caught twice as much material but not a single specimen of the new Copepod. The surface-nets are also somewhat divergent in their results, while the deeper weighted net has caught a very much larger quantity of material, the greater part of which is clearly made up of Copepoda both young and old—about ninety-five thousand in all.

The two species of Cladocera found in our district, *Podon intermedius* and *Evadne nordmanni*, occur mainly in summer, in a wide sense, ranging from the end of March to the beginning of October. Our first record of *Podon* is six specimens on March 26th, and the last is fifty on October 9th. *Evadne* begins with ten on March 29th, reached 500 on April 9th, and ends with 50 on September 20th. Tens, twenties and thirties are common numbers in the records of both species, but sometimes the hundreds are reached. As a rule there is no great difference between surface and deeper hauls, and occasionally there is a great constancy of results, indicating an even distribution:—e. g., on April 18th at Station II.

At Station II.	Surface-nets.		10 faths.	Shear-net.	
Podon intermedius	150	150	—	—	
Evadne nordmanni	100	100	150	50	50

On April 19th, in the bay, two similar surface hauls took 40 and 37 *Podon*, and 75 *Evadne* each; and at the same time, at

Station II, ten miles off, the two surface-nets took 40 *Podon* and 75 *Evadne* each. Other similar cases might be quoted; but on the other hand there are diverse hauls on other dates showing a very uneven distribution. The numbers during May and June are relatively high :—

Podon	190	80	150	100	100	150
Evadne	60	80	300	300	300	650

This is the highest point reached by *Evadne*, and this form is practically absent, or only occasionally present, during the latter half of August and parts of September. *Podon* reaches a climax (500) rather later, on August 13th, and soon after that drops to tens and even units, with an occasional appearance (August 31st, 200) in greater numbers. During most of September the group is but scantily represented; although neither species is ever absent for long, and occasional larger numbers occur—such as September 19th, off Calf Island, deep net, *Podon* 70 and *Evadne* 100; and September 20th, Station I, shear-net, *Podon* 110 and 290, deep net 140, and, at the same time, inside the bay, 182. On September 23rd the ordinary surface-net inside the bay took 550 *Podon*, and the following day 100, after which the numbers fall off rapidly.

The common species of *Oikopleura* that occurs in our district (*O. dioica*) is also a form which seems to deserve special notice. It occurs throughout the year, being present in every month, and represented in nearly every gathering. It is absent or rare in the case of the hauls taken on a few dates between August 24th and 28th, and then again on September 4th and 5th. With those exceptions, *Oikopleura* is one of the most constant of organisms at all times of the year, and, moreover, is usually present in quantities that range within narrow limits, so that it does not vary to the extent that some Copepoda and Diatoms do. In the winter months—December, January, February and March—the numbers taken are low, but from April to November inclusive quantities of a thousand or two per net are very frequently taken. The highest numbers occur in April, and they only reach 5500 per net, so there is no marked maximum.

In some cases the numbers of *Oikopleura* remain remarkably constant for several hauls, indicating a very general distribution through the water. For example, in one traverse of Port Erin Bay 2780 were caught, and in the return traverse 2030; then again, two adjacent hauls gave 3840 and 3600 respectively, and another pair of simultaneous hauls gave 2250 each. But on the other hand, on another occasion, two successive traverses of the bay gave 5050 and 2480 respectively, and other examples of diverse results might be quoted from our records. But on the whole the impression received by an inspection of the records is that *Oikopleura* is more evenly distributed through the water than most of the other common organisms.

In regard to the horizontal distribution, a mere inspection of

our results shows in some cases close resemblances between adjacent stations (such as I and II) on the same day, or between adjacent days at the same station, and in other cases just as striking differences. How far these points of similarity and of divergence are normal and are fundamental, or how far they are due to wind, sun, and other weather conditions, or to tidal or other currents, will require detailed consideration.

A further point that has been brought out in the progress of this investigation is the obvious distribution of at least some organisms in swarms. This can occasionally be seen by the eye, when, for example, shoals of large Medusæ are encountered which are so abundant for a limited area that on a calm day they may cover the surface like a tessellated pavement, and assume polygonal forms from mutual pressure. On other occasions the nets have evidently encountered swarms of Copepoda, of Cirripede Nauplii, of Crab Zoeas, of worm larvæ or of other organisms. One might expect such results in the case of neritic forms, which are merely stages in the life-history of some gregarious organism; but the occurrence is by no means confined to such, it extends to oceanic organisms on the high seas, and this sporadic distribution in swarms has not been sufficiently taken into account by some writers who have treated of the distribution of the plankton in recent years.

The Irish Sea contains a surprising number of what are usually regarded as "oceanic" species—not merely as occasional visitants, but as normal and continuous constituents of the plankton during a great part of the year. Amongst these may be mentioned *Chætoceros densum*, *Coscinodiscus radiatus*, *Rhizosolenia semispina*, *Ceratium tripos*, *Peridinium* sp., *Tomopteris onisciformis*, *Sagitta bipunctata*, *Pleurobrachia pileus*, *Calanus helgolandicus*, *Anomalocera pattersoni*, *Acartia clausi*, *Oithona similis*, and *Oikopleura dioica*. Some of these oceanic species seem, so far as we can judge from the published records, to be more abundant and more continuously present round the Isle of Man than they are even in the western part of the English Channel.

We have evidence from our closing vertical nets that the zone of most abundant life is not on the surface but is generally a few fathoms below—say, usually, between 5 and 10 fathoms. Samples of water from 5, 10 and 20 fathoms obtained with the "Mill" water-bottle support the above statement. But this conclusion was arrived at and could be established, quite apart from the evidence of the vertical nets, from a comparison of the results obtained by the weighted and surface open horizontal tow-nets. At the time of the Diatom maximum in spring, however, our closing vertical nets showed that these Protophyta are more abundant in the deeper zones than at the surface, and increase in density downwards to at least 20 fathoms.

In the cases of some groups, *e. g.* Cladocera and Oikopleura, the distribution is sometimes remarkably regular, the same numbers being taken simultaneously by comparable nets at

localities up to ten miles apart; but on the other hand, even with these same groups there may, on other dates, be very diverse hauls indicating an uneven distribution. Some species, and some groups of neritic larvæ markedly congregate in shoals, and this also adds to the unevenness of the distribution.

The horizontal distribution of the plankton is consequently liable to be very variable and irregular, and although its characteristic constitution at different times of the year may be described, and the relative abundance of the different groups discussed, it is very doubtful whether any numerical estimates can be framed which will be applicable to wide areas.

It is clear that samples taken quarterly, monthly, or even fortnightly, are quite inadequate to convey a correct idea of the constitution and changes of the plankton of a sea-area in any detail; and, consequently, conclusions ought not to be drawn from such insufficient observations. Samples, taken weekly throughout the year, and almost daily during the three most critical months, give by no means too much information, but will probably suffice to enable one to make that detailed comparison between adjacent localities and dates which are necessary for the purpose of determining the representative value of such periodic samples.

In thinking of this address last winter there was another subject that I hoped to have laid before you. It was a comparison of the conditions of a certain fishing bank in the Irish Sea 70 years ago and at the present time, and it seemed to me that this would be a particularly appropriate study to lay before this Society since it involved questions of Zoology, Botany, and Geology combined which might interest many of our Fellows. I started some of the necessary investigations at sea last summer and hoped to have completed them this Easter, but unfortunately winds and weather were such in the Irish Sea during April that I could not get near to the bank in question. Consequently, the research is still incomplete, but it may interest you to have the problem briefly stated, and I shall hope on some future occasion to publish the results obtained.

In the 'Annals and Magazine' for 1839 Professor Edward Forbes published a short paper entitled, "On a Shell-bank in the Irish Sea, considered Zoologically and Geologically" (Ann. & Mag. Nat. Hist. vol. iv. 1840, p. 217), in which he recorded the results obtained during some years of occasional dredging on a scallop bank lying opposite Ballaugh off the North-West of the Isle of Man. As these observations extended over seven years previous to 1839, if we reckon from a period about the middle of his work we may consider that we are now dealing with a record of the condition of the marine fauna on this bank well over 70 years ago. It seemed to me that we had here an opportunity, such as rarely occurs, of determining whether any change had taken place in a limited, well-defined area after a considerable interval of time. Forbes, unfortunately, did not deal with all

groups of animals, and in fact he paid most attention to Mollusca, and only recorded in addition the Echinodermata and a few of the Zoophytes. Still we may be thankful for what he has given us at such an early date, and it will be interesting to see what can be made of it in comparison with our observations at the present time. He ends his paper with the following paragraph :—

"I have drawn up these observations chiefly in the hope of inducing others to present us with similar reviews of the shell-banks of our coast. Geology and zoology will gain as much by inquiring how our marine animals are associated together as by investigating genera and species, though the former subject has, as yet, been but little attended to in comparison with the latter."

That sentiment is in such thorough accord with the views of nature frequently expressed in these rooms, that I am sure you will approve of Forbes's observations of seventy years ago, and of my view that the work he began should now be continued and extended.

As yet we have had only a few days' work on the Ballaugh bank, and if we have already found more species than Forbes records, that does not necessarily lead us to the conclusion that the fauna is now more abundant, since we have dealt with some groups of animals that were not given in the older list, and possibly our modern methods with a convenient steamer, an Agassiz trawl and wire-rope enable us to work more rapidly and effectively. But looking merely at the groups recorded by Forbes, we find that we have not found quite so many Mollusca, but a great many more Zoophytes and Polyzoa. The bank seems to be particularly rich in Nudibranchiata and in Cœlenterata : in one haul we counted 200 beautiful colonies of *Alcyonium digitatum*, including both white and orange forms.

There is no object in making a detailed comparison or in attempting to draw any conclusions until we have done more work on the bank, and accumulated a greater number of records. It occurred to me, however, that it would be interesting to extend the range of the observations by including two other shell-banks under somewhat different conditions, and showing apparently very different bottom-deposits. These are (1) the Train bank, lying about 8 miles N.W. of Port Erin, where there is a good deal of mud mixed with the sand ; and (2) the Wart bank, lying 2 miles S. of Spanish Head, near Port St. Mary, and having the bottom formed chiefly of broken shells and other calcareous fragments. These three banks—the Ballaugh, the Train, and the Wart—lying in the "Coralline" zone off the Isle of Man, ought, in the end, to give us interesting information in regard to the common characteristics and the individual features of such fishing banks in our seas. The problems of the sea are still manifold, and at least as important, in their connection with human affairs, as any that confront the modern biologist.

Mr. JOHN HOPKINSON moved:—"That the President be thanked for his excellent Address, and that he be requested to allow it to be printed and circulated amongst the Fellows," which was seconded by Mr. P. EWING, and carried unanimously.

The ballots for Council and Officers having been respectively closed at the times required by the Bye-Laws, the President appointed Mr. George S. Saunders, Mr. E. R. Burdon, and Mr. Henry Groves, Scrutineers. The votes having been counted by them and reported to the President, he declared the result as follows:—

For the Council:—E. A. NEWELL ARBER, M.A., LEONARD A. BOODLE, Esq., Prof. GILBERT C. BOURNE, D.Sc., Sir FRANK CRISP, Prof. ARTHUR DENDY, D.Sc., F.R.S., Prof. J. B. FARMER, F.R.S., Dr. G. HERBERT FOWLER, Prof. W. A. HERDMAN, F.R.S., Prof. J. P. HILL, M.A., D.Sc., JOHN HOPKINSON, F.G.S., Dr. B. DAYDON JACKSON, HORACE W. MONCKTON, F.G.S., Prof. F. W. OLIVER, F.R.S., R. INNES POCOCK, F.Z.S., Lt.-Col. D. PRAIN, F.R.S., Miss ETHEL SARGANT, Dr. DUKINFIELD H. SCOTT, F.R.S., Dr. OTTO STAPF, F.R.S., Prof. F. E. WEISS, D.Sc., and Dr. A. SMITH WOODWARD, F.R.S.

The President then appointed the same Scrutineers to examine the ballot for the Officers, and the votes having been cast up and reported to the President, he declared the result as follows:—

President: Dr. DUKINFIELD HENRY SCOTT, M.A., F.R.S.

Treasurer: HORACE W. MONCKTON, F.G.S.

Secretaries: Dr. B. DAYDON JACKSON,
Prof. A. DENDY, D.Sc., F.R.S., and
Dr. OTTO STAPF, F.R.S.

The PRESIDENT then addressing the Rev. T. R. R. STEBBING, M.A., F.R.S., some time Fellow and Tutor of Worcester College, Oxford, and recently Zoological Secretary of the Linnean Society, spoke as follows:—

Mr. STEBBING,—Pleasant as it always must be to a President to act as the representative of the Council in declaring the award of the Linnean Medal to a distinguished man of Science, I think you will understand how especially congenial the duty is to me on the present occasion, when the worthy recipient is a tried friend and has been an honoured colleague. To you and to me, Mr. Stebbing, it might be more natural and more pleasant if I were able to stop at this point; but, as you are aware, it is our custom to have the claims of the medallist recited, so I must do my duty even to your face, and you must submit with what patience you can muster.

The Rev. T. R. R. Stebbing, F.R.S., has been an ardent and most successful student of the Crustacea for the last 35 years. His first contribution to knowledge on the subject is dated 1873 *, and he has published in all between 60 and 70 important memoirs and papers. During all these years he has been indefatigable in making known novelties in structure, classification, and distribution, and in correcting errors in fact or in nomenclature. Although he has ranged widely over the vast field of Carcinology, still his chief labours have been amongst the Isopoda and Amphipoda.

To most zoologists, however, Mr. Stebbing's name is chiefly known in connection not with this mass of special papers, but with certain great works of a monographic nature. His report upon the Amphipoda of the 'Challenger' Expedition (1888) occupies three massive quarto volumes comprising 1761 pages of letterpress and 212 lithographed plates. This monumental work is remarkable not only for the careful and accurate descriptions and drawings of the many new species, but even more for the invaluable bibliography giving a full and critical report of everything that had been written respecting these Crustacea from the time of Aristotle to the year 1887. This detailed analysis occupies more than 600 pages, and is nothing less than a history of our knowledge of the group.

Turning for a moment to two less monumental, but excellent volumes, we have (1) our author's 'Naturalist of Cumbrae,' published in 1891, and giving a charming account of the life and work of the veteran west-coast marine biologist David Robertson; and (2) his 'History of Crustacea' (1893), published in the International Scientific Series—an extremely useful work, which has supplied many students and teachers with the most recent information and correct nomenclature in regard to the British species of Podophthalmata, Cumacea, and Isopoda.

One of the latest and perhaps the most valuable of Stebbing's works is his volume of 'Das Tierreich' (21. Lieferung, Amphipoda: I. Gammaridea, Berlin 1906), which gives abundant evidence of his untiring labour and exhaustive research. This colossal work gives masterly diagnoses of every known species of the group, and must for long remain the standard work on the subject. The amount of skilled labour expended upon this book and upon his 'Challenger' report is almost appalling to contemplate.

It is impossible to allude on this occasion to the numerous useful papers on Amphipoda published by our Medallist in the 'Annals and Magazine of Natural History,' and elsewhere, between 1874 and 1908—and each one of them bringing a welcome contribution to science—but I shall mention in conclusion a few

* But his scientific career apparently began in 1869 with a paper on "Darwinism," read before the Torquay Natural History Society, and re-published in his little volume entitled 'Essays on Darwinism' (Longmans, Green, & Co.: London, 1871).

of his more important larger papers published in the 'Transactions' of our own and other Societies :—

A joint report, in 1886, with our former Linnean Medallist, Canon Norman, on the Isopoda of the 'Lightning,' 'Porcupine,' and 'Valorous' Expeditions (Trans. Zool. Soc. vol. xii.).

New Amphipoda from Singapore and New Zealand (Trans. Zool. Soc. vol. xii., 1887).

The Genus *Urothoë*, &c. (Trans. Zool. Soc. vol. xiii., 1891).

Amphipoda of the Voyages of the 'Willem Barents' in Arctic Seas ; 1894.

Nine new species of Amphipoda from the Tropical Atlantic (Trans. Zool. Soc. vol. xiii., 1895).

Crustacea brought by Dr. Willey from the South Seas ; 1900.

Amphipoda from the Copenhagen Museum, &c. (Trans. Linn. Soc., Zool. 2 ser. vol. vii., 1897–99).

Report on Isopoda in Herdman's Ceylon Pearl Fisheries, Part IV. (Royal Soc., 1905).

Marine Investigations in South Africa—South African Crustacea, four parts ; 1900–1908.

Any analysis of these or other papers I might add to the list would take me far beyond the limits of time set on this occasion. I have heard it said that the distinguishing qualities of Mr. Stebbing's work are critical insight, industry and accuracy, and it would be difficult to find a more valuable combination for the promotion of true science.

There is, however, another side to Mr. Stebbing's work which I must just mention, and that is his zeal and influence in promoting the study of Natural History in local scientific societies, and his success in interesting the layman in the results of scientific research. Finally, we in this Society do not require to be reminded of our medallist's whole-hearted devotion to our interests during the four years when he occupied the important position of Zoological Secretary. His labours both on the Council and at our evening meetings were much appreciated, and we were very unwilling to allow him to retire from office, even while we approved his wish to obtain more leisure for original work.

We ask you, Mr. Stebbing, to receive this Medal as a recognition on our part of your successful devotion to Natural Science, and we hope that you may long continue those admirable researches which have so widely extended our knowledge of Carcinology.

In reply Mr. STEBBING said :—

Mr. President, Ladies and Gentlemen,—Some of you may remember the legal story of a man charged with stealing a silver cup. By the eloquence and ingenuity of the counsel assigned to

him he was triumphantly acquitted. In the afternoon he called upon his advocate, and pathetically explained that he was too poor to pay any fee, unless the gentleman would accept the silver cup. After listening to all that the President has so skilfully urged in my defence, I almost feel as if I ought to offer him the medal back again, to show that I too know how to be grateful.

This is an occasion when pride and humility go hand in hand. The most modest of men could not help feeling elated at so signal an honour as the bestowal of this medal confers. Most of you are already well aware that I *am* (or was) the most modest of men, but you have spoiled all that and ruined my character by making me the proudest. At any rate the circumstances may excuse my being a little egotistical, not to praise, or appraise, but simply to explain myself. The education of my boyhood some sixty years ago, according to the custom of the time, included no tincture of science. It was nothing accounted of in those days. All the attractions and rewards were in other directions. When, a few years later, I went up to Oxford, it happened that Dr. Acland offered a prize for the best essay on the Fauna of Christ Church Meadow. To myself and other undergraduates, on reading the notice posted in the College Hall, the scope of the subject was a rather comical mystery. In the year 1858, a year which this Society considers memorable, it chanced that my time came to take orders, and I was examined and ordained by a memorable man, Samuel Wilberforce, then Bishop of Oxford. For some years before and after that date I was engaged in learning and teaching a miscellaneous mass of ancient classics and modern history, English law and general theology. During this period there broke out, as you well know, a furious controversy between the champions of science and the champions of orthodox religion. Had the ecclesiastical party not lifted their voices so loudly, I might long have remained in a state of ingenuous innocence. But the clamour was shrill and in due course penetrated to my ears. Being an enthusiastic young clergyman, and also in those days passionately fond of arguing, I felt it my bounden duty to join in the fray.

You see, I had at my command a weapon of keen temper, long tested, and guaranteed to be invincible, if rightly used, against every other that could be wielded against it. Accordingly I approached the reading of Charles Darwin's 'Origin of Species' with an easy confidence that I should be able to smash up his heresy and others like it. Instead of which I became an ardent convert, and very soon went on to deliver lectures and preach sermons, harping continually on the new views. These expressions of opinion were, it appeared, very agreeable to those who agreed with them, but very annoying and distasteful to the others.

After a while it occurred to me that I knew scarcely anything at first hand of those facts of nature upon which the issue of the contest really rested. This reflection led me to those zoological

studies, fascinating but laborious, since pursued through so many years of my life, with it must be admitted a plodding industry, on the results of which the President this afternoon has contrived in his kindly review to shed a passing gleam of sunshine. Along with these unambitious efforts my awakened mind could not neglect the history and progress of science in some of its many branches. For, turn where you will, to astronomy, geology, biology, or almost any other compartment of human enquiry, you learn in some important regards the very same lessons. For example, you find that the most eminent among teachers and thinkers and practical men all from time to time make gross blunders, so that confessedly we are all liable to error, even, as the witty Cambridge philosopher added, even the youngest of us. But apart from the stumblings of individual students, in every school of thought and section of science we find continual changes of opinion, new points of view and new discoveries upsetting old theories, however firmly they seemed to be grounded. The inference is clear that in man's intellectual efforts there is as yet no finality. We are and always have been only making guesses at truth. How absurd it would have been had any parliament of science been enabled to enact that all scientific truth was enunciated by a selected list of writers extending from Aristotle to Lord Bacon, and that nothing could be true in science unless it conformed with what those writers had already told us! Now, this is exactly what has happened with a selected list of old Semitic literature, that very weapon which I was originally taught to confide in as invincible, and which thousands of persons still regard as a single book, instead of what it is in fact, a highly diversified assemblage of writings, attended by all those incidents of uncertainty to which human effort is at all times liable.

There is, I think, nothing in science to prevent our believing that, unseen by the physical eye, there may be horses and chariots of fire camping round about the righteous to protect them from all evil, or that there may be guardian angels whispering to the inner ear, "This is the way, walk ye in it, turning neither to the right hand nor to the left." But, because these things are possible, is it not childish to maintain that the Hebrew literature, extending over many centuries, is one and indivisible, while the facts show plainly the very opposite of this contention? From beginning to end we find a long succession of guesses at truth, some of them in the highest degree ennobling, consoling, full of hope, radiant with sweet charity, but others totally inconsistent with these, grotesque or inhuman, such as have fettered the human mind for ages and have exercised over it again and again an intolerable tyranny. There is about to meet in this country a great Pan-Anglican Congress, in which will be gathered ecclesiastics, not only high in station but of lofty ideals, self-denying lives, men (be it remembered) fully equal in mental calibre to our leading men of science. Consider now the hold on general education which these able theologians with an immense following will claim to exercise.

Consider, too, the vast energy which is expended on missionary undertakings, and reflect that thousands of our clerical teachers, whatever their abilities, know practically nothing of science or criticism, but continue to draw the most momentous conclusions from premises preposterously weak. Under these circumstances ought our men of science coldly, haughtily, disdainfully to stand aloof from such a congress? Ought they not rather to grapple with the situation and force, if possible, an answer to the question whether religion is the only science in which the advancement of knowledge and the discovery of truth are of no importance.

From these agitating thoughts the hour warns me that I must now abruptly turn to complete the shamefaced expression of my personal gratitude. I had thought of many hypotheses to account for the miracle of my position here to-day, but I renounce them all in favour of this simple acknowledgment, that I am steeped in profound satisfaction at what I am fain to cherish as an act of affection on the part of former colleagues and present companions in arms. It is an added charm that I have received the Medal from the hands of one who, during four stirring years of the Society's history, has presided over us with a wonderfully genial, enlightened, and inspiriting grace, and has shown himself to me, and no doubt to many others, invariably a warm-hearted friend.

The General Secretary then placed upon the table obituary notices of deceased Fellows and others.

Lieut.-Colonel Prain, F.R.S., then moved a vote of cordial thanks to the retiring President for his valuable and unremitting exertions for the good of the Society during his term of office, which having been seconded by Mr. A. O. Walker was carried by acclamation.

OBITUARY NOTICES.

José Vicente Barboza du Bocage was born in the island of Madeira on the 2nd May, 1823. Shortly afterwards his father was obliged to leave the island for political reasons and did not return till 1834, when the Liberal party had finally triumphed.

In 1839 José Vicente was sent to Portugal, to the University of Coimbra, where he distinguished himself in Mathematics and Medicine. He took his degree in 1846, when a revolution taking place he enlisted in the Students' Battalion and served during the year's campaign under General Povoas. Peace being restored, Dr. Bocage settled in Lisbon and practised as a medical man, and was appointed Surgeon to the principal Lisbon Hospital.

In 1849 he was appointed sub-professor of Zoology at the Polytechnic Institute.

He married in 1851 and has had one son, the present Colonel Carlos Roma du Bocage, and his widow also survives him.

In 1878 he was elected a deputy to the Portuguese Cortes, and there displayed considerable parliamentary talent; in 1881 he was created a peer and joined the Upper House.

In 1883 he took office as Minister of the Navy and Colonies, and in 1884 became Minister for Foreign Affairs. He then withdrew from politics and decided to devote his energies entirely to science; but when, in 1890, the dispute occurred between Great Britain and Portugal regarding East African affairs, and Lord Salisbury was compelled to send an ultimatum to the Portuguese Government, he was requested by the King to resume the post of Minister for Foreign Affairs, which post he filled with great success during this critical period. After this he then retired finally from public life, merely attending occasionally the meetings of the Privy Council.

He published many valuable works and papers on Zoology, and was a contributor to the Annals of the Academy of Sciences of Lisbon and to the Proceedings of the Zoological Society of London. Amongst his best known works are those on the Birds of Portugal and the Azores, the Birds, Reptiles, and some Mammals of Western Africa, also on Portuguese Fishes, especially the Squalidæ of the Portuguese coasts.

Besides being a Councillor of State and member of the House of Peers, he held the Grand Crosses of the Orders of Santiago, of the Spanish Naval Order, and of the Austrian Order of Francis Joseph, besides being a Knight Commander of the Legion of Honour and of the Order of Izabel la Catolica.

Although his sight failed in the year 1896, he bore this trial with the greatest resignation and continued to do much valuable scientific work. The earlier part of his long life was passed in stormy times, but, unlike many others, he emerged with a blameless reputation, and it was with great repugnance that he had repeatedly to abandon his beloved scientific pursuits to undertake many difficult political appointments.

He was elected a Foreign Member of the Linnean Society in 1876. [A. W. Tait.]

Dr. Robert Barnes was elected a Fellow on the 18th June, 1896, when 78 years of age; he died at Bernersmede, Eastbourne, on Sunday, 12th May, 1907. Born in 1818, he spent his early school-days in Bruges, and began his medical studies at University College, London, after an apprenticeship to a Mr. Griffin, at Norwich. He then became a student at St. George's Hospital, and after qualifying for practice as a member of the Royal College of Surgeons, London, he went to Paris in 1842, remaining a

twelvemonth in the study of Medicine, Surgery, and Obstetrics. Returning to England, he became a general practitioner at Notting Hill, and gradually attaining a position as a teacher, he was appointed Assistant Obstetric Physician to the London Hospital. From this he passed to other hospital appointments, was a Member of the Royal College of Physicians in 1853, and Fellow in 1857.

He left behind him the reputation of an able lecturer and teacher. His "Lectures on Obstetric Operations" is in its fourth edition, and still a text-book; his smaller papers were entirely concerned with professional topics. He amassed a considerable fortune, of which he bequeathed £2000 to London Hospitals.

[B. D. J.]

The Rev. Richard Baron was born 8th September, 1847, and entered the Lancashire Independent College for theological training, but at the instigation of the veteran missionary William Ellis, of South-Sea Island and Madagascar fame, he resolved to devote his life to missionary work in the vast African island. He left England to take up his duties in 1872, but though he applied himself with remarkable success to mastering the Malagasy language, with subsequent translations into that tongue, he found time to study and collect plants and minerals. Of plants the total number sent by him to Kew between 1880 and 1896 amounts to 11,834, many of which were described from time to time by Mr. J. G. Baker, F.R.S. The following are that botanist's chief papers upon Mr. Baron's materials:—

(*a*) Contributions to the Flora of Central Madagascar. Journ. Bot. xx. (1882) 17–20, 45–51, 67–70, 109–114, 137–140, 169–173, 218–222, 243–245, 266–271.

(*b*) Contributions to the Flora of Madagascar.—Part I. Polypetalæ. Journ. Linn. Soc., Bot. xx. (1883) 87–158, pls. 22, 23.

—— Part II. Monopetalæ. *Ib.* 159–236, pls. 24–27.

—— Part III. Incompletæ, Monocotyledons, and Filices. *Ib.* 237–304.

(*c*) Further Contributions to the Flora of Central Madagascar. *Ib.* xxi. (1884) 317–353.

—— Second and Final Part. *Ib.* (1885) 407–455.

(*d*) Further Contributions to the Flora of Madagascar. *Ib.* xxv. (1889–90) 294–350, pls. 50–53.

To these must be added Mr. Baron's own conclusions entitled "The Flora of Madagascar," in the last cited volume of our Journal (xxv. 246–224), with a sketch-map, which he read before the Society on 1st November, 1888; he had then been a Fellow since 7th December, 1882.

His mineralogical labours in Madagascar were aided by the gift of a special microscope for prepared rock-specimens, from the Royal Society, and he also became a Fellow of the Geological

Society in 1889. On his reaching his sixtieth year he contemplated retiring, and came home on furlough in April 1907, staying for a few weeks in London, where he had an attack of blackwater fever. Recovering from this, he spent a couple of months in the Lake district, closing his trip with a fortnight with a nephew in Kendal. Leaving that place for Morecambe, on the day after his arrival, October 12th, 1907, he seemed in his usual health in the morning; in the afternoon a slight attack of fever set in, and he retired to bed, but shortly afterwards he expired. He was buried at Kendal the following Wednesday.

The genus *Baronia*, of the natural family of Anacardiaceæ, was dedicated to our deceased Fellow by Mr. J. G. Baker, in 1882.

[B. D. J.]

Edward Arthur Lionel Batters's death on the 11th August, 1907, came as a painful surprise to his friends, who knew that he had only the month before removed from Hertfordshire into Buckinghamshire, at Gerrard's Cross.

He was the fifth son of Mr. George Batters of Enfield, and was born on the 26th December, 1860; he received his education at King's College School, London, and Trinity Hall, Cambridge, graduating in Arts, afterwards taking the degree of LL.B., and being called to the Bar at Lincoln's Inn. Having early acquired a love for natural history, and not being dependent upon his profession, he came to study Algæ with keen interest, and remained constant to that department of botany to the end of his life.

In 1888 he published his first paper, "A description of three new Marine Algæ," in our 'Journal,' Botany, xxiv. pp. 450–453, plate 18, and in the next year brought out his account of the Marine Algæ of Berwick-upon-Tweed, where much of his time had been spent as a child; and afterwards, with Mr. E. M. Holmes, he prepared a list of British Marine Algæ, which came out in the 'Annals of Botany' in 1890, pp. 63–107; the following year he issued in the 'Journal of Botany' his "Handlist of the Algæ of the Clyde Sea Area," with map.

In 1892 he became associated with 'Grevillea,' and till 1894, when that journal was discontinued, he had charge of the Algological portion. His most noteworthy contribution to science was his "Catalogue of the British Marine Algæ, being a list of all the species of Seaweeds known to occur on the shores of the British Islands, with the localities where they are found," which was issued as a Supplement to the 'Journal of Botany' for 1902, and consists of 107 pages in addition to the titlepage. This was meant as the forerunner of a treatise which was expected from him, but was only begun; his extraordinary knowledge of the facts, which only needed to be reduced to writing, is wholly lost, as he was accustomed to rely upon a retentive and well-stored memory, rather than upon notes.

His herbarium is believed to contain more than 13,000 specimens, British and foreign, the former constituting about three-fourths of the whole.

A portrait will be found in the 'Journal of Botany' for 1907, opposite page 385, and to the kindly notice of our deceased Fellow, contributed to that journal by Mr. & Mrs. Gepp, the writer is greatly indebted for many of the above-mentioned facts. They conclude by stating, "Both as a friend and as a botanist, he will be sorely missed. His kindly, modest, unselfish nature made him beloved by everybody with whom he came in contact. In his particular branch of botany his loss is quite irreparable. Such a good systematist and collector is rare nowadays. The knowledge which he possessed is not to be learned from books or classes, and demands both natural aptitude and years of observation and study."

He was elected Fellow, 18th January, 1883. [B. D. J.]

John Benbow was born at Maidenhead, 6th March, 1821, and died at Uxbridge, where he had long resided, 10th February, 1908, within a few weeks of his 87th birthday. British botanists are familiar with his work in local records, and although handicapped by the loss of sight in one eye, he managed to discover plants overlooked by younger men enjoying the use of both eyes. For many years he had devoted attention to the Willows, *Carices*, *Rubi*, and Mosses, chiefly in the counties of Middlesex, Bucks, and Herts, from time to time contributing notes and short articles to the 'Journal of Botany.' He was elected Fellow of the Society, 20th January, 1887. [B. D. J.]

Sir Dietrich Brandis, K.C.I.E., F.R.S., a pioneer of the Forest Department of British India, was born at Bonn, on the 31st March, 1824 (or, as other accounts have it, the following day). He was the son of Christian A. Brandis, Professor of Philosophy in that University. Father and son passed several years in Greece, and on his return to Northern Europe our late Fellow pursued his studies in the Universities of Copenhagen, Göttingen, and Bonn. At the age of 25, in 1849, he became Privat-Docent on Botany at Bonn, and in 1854 he married Rachel Shepherd, daughter of Dr. Marshman of Bengal, which became a determining factor in his life. His brother-in-law General Sir Henry Havelock, shortly afterwards, drew the attention of Lord Dalhousie to the merits of Brandis as a fit person to take charge of the teak forests of Pegu in Burma, which had recently come under British supremacy. Brandis landed at Calcutta in 1856, and had a single interview with the Viceroy, whom he never saw again; but his Lordship's remark, that if the scheme propounded by Brandis were carried out, it would prove of the greatest value to the country, was never forgotten by the new officer. Brandis came at an opportune moment, and by systematic and hard work managed to save the teak forests from reckless exploitation, but also so regulated their management that they are now the chief sources of teak timber in the world. His first report on the Pegu Teak forests for 1857–60 was issued in London in 1860, and

eighteen months later he was summoned to Simla, presumably on the advice of Dr. H. F. Cleghorn, to advise upon forest matters in the Northern Provinces. In 1864 he was appointed the first Inspector-General of Forests, and thereupon set on foot systematic and uniform forest discipline throughout British India. The department has now an area of nearly 240,000 square miles, that is, twice the area of the United Kingdom.

His subordinates were at first drawn from those trained on the continent, later his assistants came from British schools, and finally he procured the establishment, in 1878, of a School of Forestry at Dehra Dun, chiefly for native officers. The result of this long-continued effort has been to place the forest resources of the Empire on a solid basis, for the supply of timber, firewood, grass, and other products, together with a revenue which has increased from £40,000, in 1864, to more than sixteen times that amount.

Official reports were issued annually, but Dr. Brandis did not confine his energies to purely official records. Dr. J. L. Stewart had been commissioned, in 1869, to bring out a Forest Flora of North-Western India, and a few sheets were put in type in 1871, when his health had become impaired, and on returning to India he died shortly afterwards. In 1872, the materials collected by Dr. Stewart were made over to Dr. Brandis, who elaborated them at Kew into the well-known 'Forest Flora of North-West and Central India,' London, 1874, octavo, with a quarto atlas of plates by W. H. Fitch. The next year he was elected into the Royal Society.

For the next quarter of a century, his published papers were on practical forestry matters. Retiring from service in 1883, at the age of 59, he settled in his native Bonn, until, in or about the year 1899, he began his last work which occupied him till the close of his life, under the title of 'Indian Trees,' with numerous figures, published in 1906, an invaluable repository of information, not only for foresters, but for botanists also.

Becoming a widower after nine years of married life, in 1867 he married Katherine, daughter of Dr. Rudolph Hasse, of Bonn, who, with three sons and one daughter, survive him. He was appointed C.I.E. in 1876, and promoted to K.C.I.E. in 1887. Concurrently with the preparation of his 'Indian Trees' he became absorbed in the structure of the leaves of bamboos, and his paper upon that subject, read 1st November, 1906, and published in March 1907, was his last contribution to science. He left for Bonn immediately after the presentation of that paper, but being taken ill soon after his return to his birthplace, he was compelled to undergo a severe operation, and after lingering for some weeks, he died on 28th May, 1907.

Before quitting England for the last time, Sir Dietrich Brandis had an album presented to him with nearly 200 signatures to an address of congratulation, in the hope that he might long enjoy his well earned rest—a wish that was not realised.

Sir Dietrich Brandis was elected a Fellow of this Society, 5th May, 1860, and thus just exceeded a period of 47 years in that connection. [B. D. J.]

John Farrah, of Harrogate, was a well-known member of the Yorkshire Naturalists' Union. He was born 28th May, 1849, and during his business life as a member of a firm in Harrogate, his leisure was given to natural history and antiquarian pursuits, and he was a generous supporter of associations devoted to those pursuits. His contributions to botany mostly appeared in 'The Naturalist,' and he also drew up an account of the flora of Nidderdale, in H. Speight's volume on that valley. His last year was saddened by the loss of a favourite son, whom he did not long survive, dying at his house, Jefferies Coate, on 13th November, 1907, and was buried on the 16th November following. He joined the Linnean Society on 19th November, 1896. [B. D. J.]

Charles Anderson Ferrier was a native of Dundee, where he was born 10th March, 1829, but lived in Arbroath from a very early age. He came to London about 1848, and obtained an introduction to William Harvey, for whom he had the greatest admiration and to whom he always referred as his best friend. His tastes were artistic and literary, and through the friendship of Harvey he was able to gain inspiration in art and introductions to authors, Thomas Hood being amongst the number; in later years he was the friend of Tom Hood the younger, whose somewhat early death he felt very keenly. Harvey sent him to Dalziel Brothers, where he remained until he commenced his own business. He always spoke of them with warm admiration and respective degrees of affection: they in their turn esteemed him highly, which may be seen in the tribute paid to him in their book upon their work, as follows:—

"Charles Anderson Ferrier, a young Scotsman of varied capabilities, who had made some small efforts at wood-engraving in his native town of Arbroath, without instruction, came to seek employment through an introduction he had obtained to the late William Harvey. He was a youth of considerable promise, and full of enthusiasm for his art. Though the specimens he had to shew were very crude, he had evidently been looked upon as a genius by his Scottish friends; but on entering our studio he was indefatigable in his studies and eager for improvement. Before he had been two months with us, he became the 'London Correspondent' of an Arbroath weekly paper. This work he generally knocked off during the hour allowed for dinner in the middle of the day. We have reason to believe that he turned his attention to scientific subjects and became a Fellow of *more than one* of the learned scientific Societies. During the whole of his life he has been a staunch Teetotaller, and has worked hard in the Temperance cause. He became a personal friend of George Cruikshank, Sir Benjamin

Ward Richardson, Sir James Crichton-Browne, and many other scientific people of the numerous learned Societies, who preferred him as an engraver because of the knowledge he possessed of the subjects he had to work upon.

"Taken altogether Ferrier became one of the most remarkable men who had their beginning as pupils in our Studio."

(From "Fifty Years' Work: Our Pupils," p. 349; by Dalziel Brothers.)

His one cause for their respect was his extreme conscientiousness, as witness the following may be cited: a question of time arose, one of the Brothers turned to the housekeeper, enquiring "Is the clock right?" "Yes" was the reply, "I set it when Mr. Ferrier arrived." "Then that's near enough!" showed that the partner concurred. The paragraph above referred to was his greatest pride. He was an active member, on the literary side, at Regent's Square Presbyterian Church, where he incurred much obloquy for his audacity in preferring Shakespere before Burns, and advocating teetotalism, which in the fifties was less understood than it is in the present day.

His early work included zoological specimens drawn by T. W. Wood, for 'Beeton's Boys' Own Magazine,' which (speaking open to correction) he continued to the end of the series; 'Land & Water,' the 'Leisure Hour,' and other Natural History publications. He became known to the Geological Society, for which he did much work in his own careful and painstaking way. The whole secret of his pleasing was—to use his own words—that "he kept the drawing of the artist" instead of altering it according to fancy or accident.

This faculty, engendered of conscientiousness and artistic appreciation of the subject, won him his good name; by treating the subject sympathetically it pleased both the draughtsman and the authors,—who wanted the picture to be what they had approved as a drawing. The advantage of this power was greatly felt and appreciated when he was producing anatomical subjects under Dr. Murie, who then was at the Zoological Gardens, when it was important to distinguish between hair, tissue, bone, and muscle.

From this point he became known to the Linnean Society and was elected Fellow, 15th June, 1882.

The love of his art, and the rapid growth of process-work, caused unspeakable sorrow to him in his later days. He mourned that a process almost purely mechanical should supersede an art which he had studied for 50 years and of which he still had much to learn. [R. M. Ferrier.]

Dr. Edward Alfred Heath, born June 22nd, 1839, at Totnes in Devon, was educated at Taunton, and was engaged in the practice of Homœopathic pharmacy, first at Torquay, and subsequently on his own account at Taunton, removing to London in 1864, where he practised in Ebury Street, Eaton Square, until December 1904, when he moved to Shoreham, Kent. He obtained his degree as

Doctor of Medicine at the Hahnemann Homœopathic College in Philadelphia, where he was resident for two years, and was a most conscientious Homœopath, taking the greatest pains to verify the plants employed in Medicine, and fully believing in and acting upon the principles of Hahnemann, and as such he met with a considerable measure of success in his practice. His spare time was occupied in the study of British and European Lepidoptera, but more specially of Exotic Coleoptera, of which he ultimately possessed one of the largest private collections in the kingdom, but published only a few new species.

In 1904 he retired to Shoreham in Kent, where he died on 4th October, 1907, of an acute attack of jaundice.

Of a retiring disposition, he took but little part in scientific meetings, but by those who had the privilege of his personal friendship he was highly esteemed and respected. [E. M. H.]

Sir James Hector, K.C.M.G., F.R.S., was born in 1834 and educated at the University of Edinburgh, receiving the degree of M.D. in 1856. He was a member of the Palliser Exploring Expedition to British North America from 1857 to 1860, having been selected by Sir Roderick Murchison to accompany the Expedition as surgeon, geologist, and naturalist. In 1861 he was appointed geologist to the Provincial Government of Otago, N.Z., and subsequently Director of the Geological Survey of New Zealand. For many years he was also Manager of the New Zealand Institute and head of the Wellington Museum. He took an active part in educational affairs, and was for some years Chancellor of the New Zealand University. He was elected a Fellow of the Royal Society in 1866, and of the Linnean Society in 1875. He was also a Fellow of the Royal Society of Edinburgh, and of the Geological Society, a Corresponding Member of the Zoological Society, and a Member of several Foreign and Colonial scientific societies. In 1875 he received the Lyell Gold Medal from the Geological Society, and in 1891 the Founder's Gold Medal from the Royal Geographical Society. He was created C.M.G. in 1875 and received the honour of Knighthood in 1887. [A. D.]

The death of Professor Frans Reinhold Kjellman a few weeks before the Linnean Festival at Uppsala in May last, was a tragic element in the midst of enthusiasm and rejoicing. Although the thought was never allowed to obtrude, it was probably present to every mind that the Chair of Botany in the University, filled with so much distinction by C. von Linné himself, was vacant on the celebration of the 200th anniversary of the birth of the great Swedish Naturalist, which had drawn representatives from many and far distant lands.

Our late Foreign Member was born at Torsö near Mariestad, on the 4th November, 1846, and in 1868 he became a student at Uppsala; as he had passed through the schools of Arvika and Karlstad, he was received into the Värmland's Nation; he sustained

his thesis in philosophy in 1872, and received his doctorate in the same year, upon which he was appointed Docent in Botany to the University; in 1883 he was named Extraordinary Professor of Botany, and in 1889 was finally installed as Borgströmian Professor of Botany and Practical Economy, which he occupied till his death.

Kjellman had early chosen Botany as the great business of his life, and pursued it steadily through his travels and the 24 years of his University professorship.

His first entry into botanic authorship was his "Bidrag till Kännedom om Skandinaviens Ectocarpeer och Tilopterider," a systematic arrangement of a critical group of Algæ, and his attention to Algæ generally remained constant to the last.

In the same year, 1872, as he received his degree of Doctor of Philosophy, he accompanied Nordenskiöld to Spitsbergen in the 'Polhem'; at which time he was only in his twenty-sixth year. One part of the expedition was to pass the winter in Spitsbergen; Kjellman belonged to the other portion which was to return home before the winter set in, and on the 16th September they were to start homeward. But on that day there broke upon them a severe storm from the north, filling Wijde-bay with immense icebergs and completely choking the entrance. Thus shut up, the expedition constructed winter-quarters in Mossel-bay, and when the cold, which had attained −21° Cent., had passed, and the icy fetters had melted, it was not till the 1st August, 1873, that the 'Gladan' and 'Onkel Adam' were able to steer homewards. During this period Kjellman made observations along the coast from South Cape to Low Island. One of his most important scientific results was the discovery that the Arctic Ocean possessed a gigantic algal flora, which uninterruptedly grew through the winter, in spite of the darkness at the sea-bottom, and, at a temperature of −1° to 1·8°, developed normally, grew, and fruited. Two years later he published a detailed popular account of the voyage entitled 'Svenska Polarexpedition år 1872–1873, under ledning af A. E. Nordenskiöld,' with woodcuts, lithographs, and map.

We soon find Kjellman again as explorer. Nordenskiöld had planned the investigation of the Arctic Ocean in an easterly direction, and in 1875 undertook a journey, which formed an epoch in the history of polar research. The Swedish expediton on board the hired Norwegian whaler 'Prövен' left Tromsö on the 8th July, passed into the Kara Sea, and without hindrance by ice, reached the mouth of the Yenisei, a position never before attained by any craft from the Atlantic. The botanists were Kjellman and A. N. Lundström, the zoologists Hj. Théel and A. Stuxberg. By the middle of August the expedition divided, Nordenskiöld gave the command to Kjellman, who accompanied by Théel returned to Norway by the Kara Sea and reached Tromsö the 5th October. The account of the return journey, so far as regards the plant and animal life, was rendered by Kjellman to the Royal Academy of Sciences, Stockholm, in 1877.

The algological result was that the Kara Sea possessed a special algal flora, consisting of elements from Novaja Semlija, Spitsbergen, the Arctic, and Ochotsk Sea. Before this, it was supposed that the slight salinity of the Kara Sea was insufficient to support marine algæ, and in reporting his results, Kjellman said, "It is reserved for future enquirers to solve this problem," but he himself after no long interval was to solve it.

From 1874 to 1877 he occupied himself diligently in exploring the west coast of Sweden, which he had previously visited during winter; and he did not restrict himself to systematic research only, but also to the life-history and distribution. Founded on these researches he published his 'Ueber die Algenvegetation des Murmanschen Meeres,' and 'Ueber Algenregionen und Algenformationen im östlichen Skager Rack' in 1878; dividing the sea-bottom into littoral, sublittoral, and elittoral regions, and distinguishing algal formations in the neighbourhood of the coast. Kjellman's point of view has found general acceptance with algologists.

In 1878 he again left Sweden to take part in the famous Swedish polar expedition, the voyage of the 'Vega.' That vessel left Karlskrona on the 22nd June, 1878, and reached Göteborg harbour, finally weighing anchor the 19th August. On the 28th September at Pitlekaj she became locked in the ice till 28th July following, when she was freed from her fetters. On the 24th April, 1880, she reached Stockholm, after having circumnavigated Asia for the first time.

During this long period Kjellman, with his well-grounded knowledge and good powers of observation, had the best opportunities for research in unknown seas and countries, and toward the solution of interesting questions. A chief feature of succeeding years was the increased scientific production due to his 'Vega' voyage. In the first place he published his botanic observations from Pitlekaj and other parts of Siberia, and gave a host of interesting data on the plant-life of this little-known part of the Arctic circle. Of the higher plant-vegetation we have of his, 'Om växtligheten på Sibiriens nordkust,' 'Sibiriska nordkustens fanerogamflora,' and other reports which appeared in the 'Vega' publications. Of special value is the work 'Ur polarväxternas lif' (1883), for which his arctic travels provided the material; but from this date, algology assumed the chief claim upon his attention, and in the year just mentioned came out his most comprehensive "Norra Ishafvets Algflora" in the Stockholm Handlingar, of 431 pages and 31 plates, part being in the English language. In this memoir Kjellman treats of 259 species in 111 genera, and the number of new species is considerable. Many of these plants were found to be as large and luxurious as those occurring in the Atlantic.

By this work Kjellman secured a high place amongst the students of marine algæ, side by side with the great workers, as the two Agardhs, and J. E. Areschoug. After several memoirs of

greater or lesser extent, he produced the first part of his 'Handbok in Skandinaviens Hafsalgflora' (1890), and wrote the account of certain groups for Engler und Prantl, 'Die natürlichen Pflanzenfamilien.'

He was selected as Extraordinary Professor in 1883, and soon showed his powers as a teacher in higher education. With a lively interest for the various branches of botany, he succeeded, through his rich flowing ideas and independent apprehension, in directing his public teaching by original and singularly successful courses for students. The many new sides of botany, which after a long period of preponderating descriptive and formal morphologic direction, began to be opened up in the last decade of the nineteenth century, such as physiologic anatomy, organography as morphology with permanent regard to vital phenomena, the developmental history of the individual, plant phylogeny, plant dispersal, the invasion of alien plants, types of organised plants, as aquatics, xerophytes, lianes, etc., all were investigated by Kjellman and utilised by him to the modernisation of the study in Sweden. By means of a bold and independent terminology, he imparted his botanic ideas and new points of view, which seemed to him to promise success. At the same time he was a critical and exacting teacher, and according to his lights he modified botanic institutions, library, work-rooms, and botanic gardens, and improved their resources. His professorial career enabled him to issue a dozen or more of treatises or discourses such as "Om nordens vårväxter," speech at a promotion of doctors at Uppsala in 1895, "De nordiska trädens arkitectonik," "Skandinaviska fanerogamflorans utvecklingshistoriska element," "Vaxtorgeni," "Svenska västernas öfvervintring," etc. On Prof. T. M. Fries retiring from the Chair of Botany in the autumn of 1900, Kjellman was appointed in his place. On his reaching the age of 60, his past and existing pupils contributed to a "Festskrift" under the title 'Botaniska studier tillägnade F. R. Kjellman den 4 November, 1906,' accompanied by a congratulatory address. He was elected a Foreign Member of the Linnean Society, 2nd May, 1901.

At the beginning of 1905 he had a slight apoplectic attack, which diminished his working powers, but he was well enough to be placed upon the committee charged to carry out the details of the Linnean celebration last year, though, as it happened, he was not able to take part in that committee's labours; but in April 1907, another and more serious stroke completely broke down his vital powers, and he died at Uppsala on the 22nd April last, when his countrymen were busied on the final preparations for the brilliant "Linnéfest."

The writer has to thank Prof. C. A. M. Lindman for a copy of his sympathetic notice of his old professor in 'Ymer,' and Dr. Aksel Andersson for a copy of the 'Inbjudningsskrift' for the public lecture on the 19th February, 1900, from which publications the foregoing account has been compiled. [B. D. J.]

Botanic and horticultural science are the poorer by the unexpected death on 30th May, 1907, of Maxwell Tylden Masters, M.D., F.R.S. He was born at Canterbury on 15th April, 1833, the youngest son of Alderman Masters, a nurseryman who effected some noteworthy hybridisations. Young Masters studied medicine at King's College Hospital, London, was admitted Licentiate of the Society of Apothecaries in 1854, and two years later became a member of the Royal College of Surgeons. He was sub-curator of the Fielding Herbarium at Oxford for a short time, and then for some years he practised as a general practitioner at Peckham, taking his degree of M.D. at St. Andrews; he was Lecturer on Botany at St. George's Hospital from 1855 to 1868, and was for some time an Examiner in Botany in the University of London, and to the Civil Service.

Dr. John Lindley, the founder and first editor of the 'Gardeners' Chronicle,' after a few years of failing health, died 1st November, 1865, and Dr. Masters was appointed joint-editor with Thomas Moore, the Curator of the Physick Garden at Chelsea. Our late Fellow once told the present writer, that although the stipend he received on entering upon this new post was no more than he had been earning at Peckham, yet the feeling of its certainty gave a relief to his mind, which he characterised as indescribable. In 1882 Moore retired, and Dr. Masters remained sole editor till his death.

He gave the best of his powers to his editorial duties, and those who knew his style, could recognise many unsigned articles in his journal, as well as those signed or initialled by him, yet he found time to write independent volumes, and to take part in serial publications, as the 'Flora of Tropical Africa,' and the 'Flora of British India.' In 1866, he was Congress Secretary for the London International Exhibition of 1866 of Horticulture and Botany, which was additionally noteworthy for the promulgation of the laws of nomenclature, largely due to the drafting of Alphouse de Candolle. The Exhibition ended in a profit of £3000, and the Report by Dr. Masters bears testimony to the care with which the details were worked out. The newly installed editor profited immensely by this experience, for it introduced him to many foreign correspondents of distinction.

As an independent author, his first essays seem to have been printed in the third volume of the Ashmolean Society's 'Transactions,' 1854, etc., while he was at the Oxford Botanic Garden. In 1860 an abstract was issued in the 'Proceedings' of the Royal Institution, "On the relation between the abnormal and normal functions in plants," followed by "Vegetable Morphology," in the British and Foreign Medico-Chirurgical Review, for 1862. These seem to have confirmed him in the study of abnormalities, resulting in his 'Vegetable Teratology' published by the Ray Society in 1869, and long out of print; the author never had leisure sufficient to revise or recast the work, but

he contributed some additions to the German translation by U. Dammer which appeared in 1886 at Leipzig. 'Botany for Beginners' was a slight, unpretentious volume in 1872; and in the same year came out a notice of Maria, Lady Hooker, which was really drawn up by the then Dr. J. D. Hooker, though attributed by many to the editor of the 'Gardeners' Chronicle' in whose columns it appeared.

During these years Dr. Masters had elaborated the natural families of Malvaceæ, Sterculiaceæ, and Tiliaceæ, which form pp. 175–268 of the first volume of the 'Flora of Tropical Africa' (1868), and the Samydaceæ, Loaseæ, Turneraceæ, and Passifloraceæ of the second volume, pp. 492–520 (1871). Similarly he was answerable for the enumeration of the Malvaceæ, Sterculiaceæ, Tiliaceæ, forming pp. 317–409, and the Olacineæ, pp. 572–598, of the first volume of the 'Flora of British India' (1874–75), and to the second volume he contributed the Passifloraceæ, pp. 598–603 (1879). From this time onward, his chief subjects of study, in addition to the above-mentioned families, were Restiaceæ and Coniferæ. He drew up an enumeration of Restiaceæ for De Candolle's 'Monographiæ,' vol. i., and described the Brazilian Passifloraceæ in Martius's great 'Flora Brasiliensis.' Many of his papers, particularly those on Coniferæ, were contributed to the pages of our publications. Thus we find that his earliest paper issued in our Journal was that on a monstrosity of the flowers of *Saponaria officinalis* in 1857, until the last from his pen, "On the Distribution of Conifers in China and Neighbouring Countries," which appeared posthumously in 1907. Forty contributions from him appeared in our Journal or 'Transactions' between 1857 and 1907. A valuable bibliography, compiled by Mr. W. Botting Hemsley, will be found in the Kew 'Bulletin of Miscellaneous Information,' 1907, pp. 327–334, but that does not include the mass of his articles in his own 'Gardeners' Chronicle.'

He was also author of very many short articles in Lindley and Moore's 'Treasury of Botany,' was largely responsible for the Report on Mixed Herbage of Permanent Meadows at Rothamsted in the 'Philosophical Transactions' (1883), and edited new editions of Henfrey's 'Elementary Course of Botany,' 2nd edition in 1870, and the 3rd and 4th in 1878 and 1884 respectively.

Dr. Masters was elected a Fellow of the Linnean Society, 6th December, 1860, and of the Royal Society in 1870; he also officiated as Chairman of the Scientific Committee of the Royal Horticultural Society, in whose welfare he took the warmest interest; of Foreign recognitions, he was a Corresponding Member of the Institute of France, and an officer of the Belgian Order of Leopold.

He is commemorated by the leguminous genus *Mastersia* (*M. assamica*), so named by Bentham in 1865.

A few weeks before his death, he became indisposed, but no

great importance was attached to his symptoms, till his death, as noted above, was made known to his large circle of friends. The funeral service took place on the 4th June, 1907, and the cremation at Woking followed. [B. D. J.]

Frederic Moore, D.Sc., F.Z.S., who was elected an Associate of the Linnean Society in 1881, died May 10th, 1907, at the age of 77. He was a distinguished entomologist, and a prominent Fellow of the Entomological Society of London for more than fifty years. For more than thirty years he was a member of the Staff of the East India Company's Museum, and his principal memoirs dealt with Oriental Lepidoptera. [A. D.]

Professor Alfred Newton was the fifth son of William Newton of Elveden Hall, Suffolk, who, for many years, represented the Borough of Ipswich in Parliament, and of Elizabeth, daughter of R. S. Milnes of Fryston, Yorkshire, who sat at one time as Member of Parliament for the City of York. Through his mother he was thus related to the late Lord Houghton and to the present Earl of Crewe.

Alfred Newton was born on June 11th, 1829, at Geneva. He was educated privately until he entered Magdalene College, Cambridge; which for the next 57 years was to prove his home.

Newton graduated in 1853, and shortly afterwards began a series of extensive travels, visiting (amongst other countries) Iceland, Lapland, North America, and the West Indies, where his family at one time held large estates. In 1864, accompanied by Sir Edward Birkbeck, he made an expedition to Spitsbergen. He was a keen yachtsman, and up till quite recent times used to enjoy his summer holiday yachting with his old friend Mr. H. Evans of Derby, on the west coast of Scotland. In the interval of his travels, Professor Newton resided at Cambridge; and in 1865, when the University was moved to change Professor Clark's Professorship of Anatomy into two, one of Human Anatomy and a second of Zoology and Comparative Anatomy, he entered the list against Dr. Drosier of Gonville and Caius College, who had been for some years Deputy to Professor Clark; and supported by a long list of testimonials from Owen, Gould, Gray, Rolleston, and others, he was successful in attaining the Chair by a majority of 28, the electors being the resident Masters of Art. At that time the study of Natural Science was not popular in the University. In the year in which Professor Newton entered upon his duties (1866) but 9 candidates appeared in the Natural Sciences Tripos, compared with over 200 at the present time. This difference is due, to some extent, to the wide and liberal spirit with which Newton exercised his functions. Though regarded as a Conservative by many people —and in fact in his politics he was in most things a Tory of the old school, and in private life adverse to change in his established order of life or surroundings—in scientific matters he was always, after weighing them over carefully, prepared to accept new ideas.

He welcomed the rise of embryology under Frank Balfour, and he took very great interest in the development of the more modern methods of studying heredity and variation. Amongst zoologists he was one of the first to adopt the theory of organic evolution, set forth by Darwin and Wallace.

When he became Professor, he had to cover the whole animal kingdom; but later, when Balfour, Sedgwick, and others covered the morphological ground, his lectures, which were always written out, dealt with the theory of Evolution and with the geographical distribution of animals. The last few years of his life he appointed a deputy, and it is characteristic of his appreciation of the value of the newer work, that he appointed Mr. Bateson, who lectured upon the researches with which his name is so intimately associated. Although (as we have said) his lectures covered, at one time, the whole animal kingdom, in his writings he restricted himself to his favourite group of birds. He published the 'Ornithology of Iceland,' 'The Birds of Greenland,' an exhaustive 'Dictionary of Birds' in which he characteristically arranged the genera in alphabetical order, holding that no existing system of classification was sufficiently satisfactory to adopt. He also wrote 'Ootheca Wolleyana"—a monumental work—the first volume of which appeared in 1864, the second and last shortly before his death. For a time he edited the 'Ibis' and 'Zoological Record,' and some of the volumes of the fourth edition of 'Yarrell's British Birds.' A small text-book on Zoology, published in 1872, was a model introduction to a great subject; and to the ninth edition of the 'Encyclopædia Britannica' he contributed numerous articles on birds, some of which (for instance, those on "Migration" and the "History of Ornithology and Geographical Distribution") are regarded as classical essays. These articles enlarged and corrected were republished in the above-mentioned Dictionary.

Professor Newton was one of the first to take an active share in the protection of birds, a subject which we have reason to believe was first officially recognised by the British Government, largely owing to his advocacy. Forty years ago, Newton brought the matter before the British Association, and for many years he was Chairman of the Close Time Committee, during which period three Acts dealing with this subject passed through Parliament. He also took a large part in organising the observation of migratory birds at various lighthouses, and other fixed stations. Of the knowledge we have acquired from these observations much, at least, is due to his foresight and powers of organisation.

The Museum of Zoology in Cambridge, which has grown to be one of the largest in the kingdom, attained its position largely under his guidance. He was always on the look out for new and valuable specimens, constantly, though anonymously, buying and presenting these. He very greatly disliked any of his donations to be recorded in the Reports of the Museums and Lecturing Syndicate. His gifts, not only of specimens, but of books, to the Library of the Department must have cost a very large sum.

His interest in old books and early editions was that of a Scholar. He spent much time and knowledge on the University Library, but his special province was the Philosophical Library, situated in the heart of the Museums, over whose destiny he presided for many years. It is largely due to him that the Library at the present time takes in over 600 periodicals, and nothing gave him greater satisfaction than when, by the careful study of booksellers' lists, he was able to complete a "broken set."

There was something peculiarly scholarly about Newton's writings; and in small matters of grammar and punctuation he was punctilious in a way that is now becoming rare. Very little that he published was of an ephemeral nature, and his printed word is characterised by a width of knowledge, untiring research, and an unusual degree of accuracy.

It is difficult to write about the personal character of one with whom the writer has lived on terms of affection and intimacy for twenty-five years. His Sunday evenings in the Old Lodge at Magdalene College were an epoch in the University life of many a student. From nine o'clock till shortly before twelve, Newton was "at home," welcoming everybody (even the youngest of us), talking to us on the subjects that he thought we knew best, stimulating us in any little efforts we might make in Natural History, and taking the widest possible view of the subject he loved so well.

When once you were a friend of Newton's, you were always his friend. He was possessed of the old-fashioned courtesy of manner, and a certain leisureness of habit, which made a visitor feel that he was not trespassing on the time of his host. Both in appearance and in character he had the finest attributes of the old race of English country gentlemen, to which by birth he belonged. To quote a writer in 'The Times,' he was "staunch in his friendships, firm in his opinions," and he invariably followed with a dogged perseverance that which he held to be right.

Professor Newton was elected Fellow of the Linnean Society March 3rd, 1857, of the Zoological in 1859, and of the Royal in 1870; in all three societies he served on the Council, and was Vice-President of the Zoological almost continuously from 1861 to 1897. He received a Royal Medal, and from the Linnean Society the Linnean Gold Medal in 1900. [A. E. S.]

His late Majesty Oscar (II.) Fredrik, commonly styled Oscar II., King of Sweden and of the Goths and Vandals, was born 21st January, 1829. He was the great-great-grandson of Marshal Bernadotte, who was chosen in 1810 to be Crown Prince of Sweden, and King in 1818. Married to the Princess Sofia Wilhelmina Mariana Henrietta, of Hesse Nassau, on the 6th June, 1857, he succeeded to the throne on the 18th September, 1872; was crowned in Sweden the 12th May and in Norway the 18th July of the following year.

Universally known and honoured as probably the most accom-

plished monarch in Europe, he was more than once called upon to arbitrate in international disputes. His knowledge of languages (he spoke at least seven fluently) enabled him not only to translate classic works from English, French, German, Spanish, and Latin, but to write poems in other languages than Swedish.

Into the political history of Scandinavia during the late King's reign, it is not our province to enter; but it may be recorded that the severance of the Norwegian people from his dominion was a deep and lasting grief. It was to the King's own exertions that a peaceful separation was effected, and a fratricidal and doubtful war was avoided.

At our centenary celebration, 24th May, 1888, His Majesty was elected by acclamation one of our Honorary Members, whose numbers, never large, had been suffered to lapse since the death of H.M. Leopold, King of the Belgians, on the 10th December, 1865, and was revived eighteen months earlier, in 1886, when His Majesty Edward VII., then the Prince of Wales, accepted the distinction. King Oscar's signature to the Roll and Charter Book was affixed on his visit to our shores in 1889, when the President and Senior Secretary were received by the Swedish monarch in special audience.

In the interview just mentioned, His Majesty disclaimed all knowledge of biology, but the services rendered to science, particularly geographical science, mainly from the King's own generosity, were large and continued practically during the whole of his reign, and even before it. Whilst he was still Duke of Östergötland and Crown Prince, he contributed handsomely to Torell's great expedition to Spitsbergen in 1861, and Nordenskiöld's expeditions to the same country in 1864, 1868, and 1872–73.

The King's extreme interest in these matters became fully manifest as regards the 'Vega' expedition of 1878–80, for as Baron Nordenskiöld himself stated, His Majesty, himself trained in the navy, discussed the details of the voyage and gave his hearty approval and support, followed later by the bestowal of the Vega medals.

Later expeditions which received the same royal support, were two Swedish expeditions in 1882 to Spitsbergen, one conducted by our latest elected Foreign Member, Prof. A. G. Nathorst, on a geological quest, the other by Ekholm, for meteorological purposes, which wintered in the north. The next year Nordenskiöld's Greenland expedition took place; in 1890 there were several north polar expeditions; Nansen's voyage in the 'Fram' in 1893-96 was largely supported by the King of Norway; financial support was also accorded to Andrée's attempt to reach the North Pole by balloon, in 1897; and Count De Geer's Isfjord investigation, shortly before, received practical support from the King. Dr. Nathorst again visited Spitsbergen and Kung Karls Land in 1898, and Andrée in 1899 went to Greenland. The Swedish-Russian measurement of a meridian in Spitsbergen in 1898 was favoured, not only by the King, but by the then Crown Prince,

now His Majesty Gustaf V. Sverdrup's polar journey, 1898–1902, and Amundsen's voyage towards the magnetic pole were furthered by State aid.

Thus for more than 40 years did the late King give his generous help to many journeys undertaken by his Swedish and Norwegian subjects northward; but he also encouraged travellers in other directions, as for instance Dr. Sven Hedin in Central Asia. Many localities have received names after the late King, as Prins Oscars Land and Kung Karls Land (Spitsbergen), Kung Oscars Bay (North Asia), Konung Oscars Hamn (Greenland), Konung Oscars Fjord, Oscar II.s Land (Spitsbergen); from Dr. Nansen we have Kong Oscars Halvö (Taimyr Bay), and from Sverdrup Kong Oscars Land (Grinnell Land); these are in the Arctic regions. Towards the Antarctic we find Kong Oscars Land (Grahams Land), Kap Oscar (Victoria Land); and in Asia Dr. Hedin discovered Konung Oscars Berg on the northern borders of Tibet.

During the last few years intervals of illness had caused the Crown Prince to act as Regent. After some weeks of increasing illness, King Oscar II. died in his palace at Stockholm on the 8th December, 1907. It will be remembered that in our General Meeting of 6th June, 1907, a telegram of respectful congratulation was sent to Their Majesties the King and Queen of Sweden, on the celebration of their golden wedding, an event which was destined to be the last of the kind in the monarch's lifetime.

[B. D. J.]

William Rome, F.S.A., born in 1842, was the son of Inspector Rome of the Essex Constabulary, and as a boy received his early education at the National Schools of his native Burnham. On leaving school he entered the well-known establishment of "Sweetings" in Cheapside, and gradually rose until he became sole proprietor. He threw himself energetically into Corporation matters, and was largely the means of establishing the loan exhibitions at the Guildhall Art Gallery. He filled many civic appointments, and in the neighbourhood of his residence, Creeksea Place, Burnham-on-Crouch, his energies were widespread. At his house he had amassed a valuable collection of antiquarian treasures, medals, and coins, which he was ready to contribute to exhibitions. After the opening of the Spanish art loan exhibition in the City of London, towards which he had worked hard, the King of Spain conferred upon him the Royal Order of Isabella the Catholic.

In the spring of 1907, Mr. Rome had a slight apoplectic attack, from which he was gradually recovering when bronchitis supervened, and after a fortnight's illness he died at his country-house, on Sunday, 20th October, 1907, in his 66th year. His connection with this Society dated from 5th December, 1889. [B. D. J.]

Howard Saunders, F.Z.S., died on the 22nd October, 1907, at the age of 72, after a long and painful illness. In him, as in so many great naturalists, the collecting instinct seems to

have shown itself at an early age, for, while still a pupil in a large private school at Rottingdean, he is said to have caused amusement and amazement to his companions by his earnestness in this pursuit. As a young man he was a great traveller, spending several years in South America, and, in 1860, exploring the headwaters of the Amazon. He was, however, no mere collector, but attained a high position as a scientific ornithologist. In 1882 he succeeded the late Professor Newton as editor of the fourth edition of 'Yarrell's British Birds,' and in 1889 he brought out his own well-known 'Manual of British Birds.' He was also the author of the Catalogue of Gulls in the British Museum, and of various other ornithological memoirs. He took an active part in the work of the scientific societies with which he was connected, serving on the Councils of the Linnean, the Zoological, and the Royal Geographical Societies, and of the British Ornithologists' Union. For six years he served the British Association as Honorary Secretary of Section D, and for a considerable time he was a joint-editor of the 'Ibis.' His service on the Council of the Linnean Society comprised three separate periods, viz. 1883–86, 1893–96, 1898–1900. [A. D.]

Alexander Somerville was an instance of an episode of business intervening in a life mainly given to biologic studies. He was born at Glasgow 25th March, 1842, was educated at Glasgow Academy and the University, passing thence into a house of business, Messrs. J. H. Young & Co. In 1865 he went to Calcutta, in the firm of Mackinnon & Mackenzie for fifteen years, but his health suffering from the Calcutta climate he came home, resumed his interrupted studies at Glasgow University, and graduated as B.Sc. on the biological side. He had met our late Fellow, Sylvanus Hanley, at Cannes, and was on his initiative proposed and elected a Fellow on 16th June, 1881. For several years he worked at marine zoology, principally mollusca, in which group he added several species by dredging off the west coast of Scotland. After this he took to botany and remained constant to this pursuit during the remainder of his life.

He identified himself with local natural history and associations, and helped to procure support for the Scottish Marine Station at Millport. A friend who was much associated with him in the Glasgow Natural History Society wrote of him:—"His sympathies religious, philanthropic, scientific, and social extended over so wide a field and were manifested in so many forms of active usefulness, that his loss would be far more deeply felt than we can ever know." He died on 5th June, 1907. The writer is indebted to the Rev. J. E. Somerville for the chief information recorded above of his brother. [B. D. J.]

Henry Clifton Sorby, LL.D. (Cantab.), F.R.S., F.S.A., F.G.S., F.Z.S., F.R.M.S., the well-known geologist, was a Fellow of the Linnean Society from 1875 until the date of his death in March

1908. He was elected a Fellow of the Royal Society in 1857 and served on the Council from 1876–77, while his eminent services to science were recognised by the award of the Society's Royal Medal. He took a prominent part in the foundation of the Sheffield University, to which he left £6500 as an endowment for a Professorship of Geology. He also left £15,000 to the Royal Society for the promotion of scientific research in connection with the University of Sheffield, and £1000 to the Geological Society.

[A. D.]

Whilst his researches into the structure of metals and rocks led to his scientific eminence, he displayed almost a boyish eagerness in depicting the marine organisms brought up by dredging from his yacht 'Glimpse.' On more than one occasion he has exhibited some of his preparations at our meetings, and he was ever seeking for improved methods of mounting and displaying his captures. The last paper he furnished to the Linnean Society was printed in our Journal (Zoology), xxix. (1906) pp. 434–439, entitled "Notes on some species of *Nereis* in the District of the Thames Estuary," which was read in the absence of the author on 1st March, 1906. His last printed paper occupies seventy pages in the 'Quarterly Journal' of the Geological Society, vol. 64, n. 254 (1908) pp. 171–232, pls. 14–18, and in the discussion it was pointed out that it suggested new methods of investigation.

[B. D. J.]

By the death of Professor Charles Stewart, LL.D., F.R.S., M.R.C.S., the Linnean Society has lost one of its most distinguished Fellows and one who has been largely identified with the work of the Society. Born at Plymouth in 1840 he was, like his father and grandfather, trained for the medical profession, obtaining the diploma of M.R.C.S. in 1862. His scientific instincts, however, were too strong to allow of his remaining for long a medical practitioner, and in 1866 he was fortunate enough to obtain an appointment as Curator of the St. Thomas's Hospital Museum, where he also lectured on Comparative Anatomy and Physiology. The great work of his life, however, was done in connection with the Museum of the Royal College of Surgeons, where he succeeded Sir W. H. Flower as Conservator, on the appointment of the latter to the Directorship of the Natural History Departments of the British Museum in 1884. Although his time was chiefly occupied with the arrangement of the Museum and with the anatomical investigations and preparations by which the Museum has so greatly benefitted, Professor Stewart nevertheless found opportunities of making his influence felt as a teacher. As Hunterian Professor of Comparative Anatomy and Physiology he lectured at the College, and he was also Fullerian Professor of Physiology at the Royal Institution for a period of four years.

Although he published little, his knowledge of the minute anatomy of both vertebrate and invertebrate animals was extra-

ordinarily wide and deep, as all must have realised who heard him speak at the meetings of the Linnean Society.

It is gratifying to be able to record that, in spite of Professor Stewart's naturally retiring and self-effacing disposition, his work was appreciated even during his lifetime, and not only by his large circle of personal friends, but also by the official dispensers of scientific honours. He was elected a Fellow of the Royal Society in 1896, and received the Honorary Degree of LL.D. from the University of Aberdeen in 1899. It was with the Linnean Society, however, that he more particularly identified himself. He was elected to the Fellowship as far back as 1866, served on the Council from 1875 to 1877, and again from 1890 to 1895, was President from 1890 to 1894, and Vice-President from 1894–1895. His Presidential Addresses, which will be found in the 'Proceedings' of the Society for the years mentioned, dealt with Secondary Sexual Characters, Commensalism and Symbiosis, the Sound-producing Organs of Animals, and the Method of Locomotion in certain Crabs and Gasteropodous Molluscs. [A. D.]

Lieut.-General Sir Richard Strachey, G.C.S.I., LL.D., F.R.S., who died on the 2nd February, 1908, from influenza, was born at Sutton Court on the 24th July, 1817, and in 1836, at the age of 19, entered the service of the Hon. East India Company, in the Bombay Engineers, was transferred to the Bengal Engineers in 1839, and during his residence in India filled many important posts. He served in the Sutlej campaign of 1845–46, and during the Indian Mutiny he was Secretary to the Government of the Central Provinces; from 1875 to 1889 he was a member of the Council for India.

As regards his work which concerns this Society, it was practically limited to a collection made in conjunction with Mr. J. E. Winterbottom in Kumaon and Garhwal, which was largely named by Sir Joseph Hooker, who with Dr. Thomson speaks thus of it:—

"The collection distributed by Captain Strachey and Mr. Winterbottom consists chiefly of the plants of Kumaon and Garhwal, and of those of the adjacent parts of Tibet. Captain Richard Strachey was appointed by the Indian Government to make a scientific survey of the province of Kumaon, and was occupied upon the task about two years, during which time, in addition to the important investigations in physical science which occupied his attention, he thoroughly explored the flora of the province, carefully noting the range of each species. He was joined by Mr. Winterbottom in 1848, and they travelled together in Tibet. Their joint collections, amounting to 2000 species, were distributed in 1852–53 to the Hookerian Herbarium, the British Museum, the Linnean Society, and some foreign museums; and the scientific results are now in the course of publication. The beautiful preservation of the specimens, and the fullness and accuracy with which they are ticketed, render this herbarium the most valuable for its size that has ever been distributed from

India; and we beg here to record our sense of the great benefit that has been rendered to botanical science by the disinterested labours of these indefatigable and accomplished collectors."—Flora Indica, i. 65–66.

On Captain Strachey's return home on leave, the sum of £500 was placed at his disposal by the Hon. East India Company for printing his report, and the second volume should have continued with the account of his plants alluded to above, but as he himself told the writer, he was unversed in printing matters, the money rapidly vanished, and the botanic part was never published, though a few copies were distributed privately. This catalogue, in a tabular form, is paged 63–122, and was printed about 1854; it was afterwards brought down to date by Mr. J. F. Duthie, F.L.S., and by him inserted as pp. 403–670 of E. T. Atkinson's 'Gazetteer of the N.W. Provinces and Oudh,' Allahabad, 1876. Early in 1898 Sir R. Strachey was anxious that the Linnean Society should make a permanent publication of his work, and produced the original maps and profiles of the country traversed, together with elaborate analyses of the constituents of the flora, in comparison with other parts of Asia and of Europe. The Council considered that such a publication would require careful work to bring it in accordance with present knowledge, and the tabular form would largely add to the cost: these reasons induced Sir Richard not to press it further in that form, but the idea was not given up, for about 1903 the manuscript was handed to Mr. Duthie, who ultimately passed it through the press, as :—'Catalogue of the Plants of Kumaon and of the adjacent portions of Garhwal and Tibet, based on the collections made by Strachey and Winterbottom during the years 1846 to 1849, and on the catalogue originally prepared in 1852 by Lt.-Gen. Sir Richard Strachey, revised and supplemented by J. F. Duthie,' London: Lovell Reeve & Co., 1906. 8vo, pp. vii, 269, and one page of corrections. In the introduction the editor enumerates the botanists who have assisted in completing the work.

For the two years 1888–90 Sir Richard was President of the Royal Geographical Society; he was rarely seen in our rooms, but on the occasion of Mr. Bentham's retirement in 1874 from the presidency, he took part in restoring harmony within the Society. He died at Hampstead, as related above, and was cremated at Golder's Green on the 15th February, 1908. His election as Fellow of this Society dated from 20th January, 1859.

It is stated that no fewer than 32 species and varieties of plants discovered by him, bear his name; botanically he is commemorated by a leguminous plant, *Stracheya tibetica*, Benth. [B. D. J.]

Although the death of William Thomas Locke Travers took place so far back as the 26th April, 1903, from the effects of an accident, the fact was not generally known till recently.

Born at Castleview, near Newcastle, County Limerick, on the 9th January, 1819, he received his education principally at

St. Servan College in France. At the age of 17 he joined the Spanish Legion during the Carlist war, and served also in the 2nd Regiment of Lancers till 1839, during which period he had also served as Aide-de-camp, and for those services was awarded the Grand Cross of the Order of Cambodia. Returning to Great Britain, in 1844 he was called to the Bar, and five years after emigrated to Nelson, becoming District Court Judge. Quitting that post, he represented various constituencies in the Parliament of New Zealand, from 1854 onwards. In 1869 he settled in Wellington, and was a chief promoter of the New Zealand Institute in 1867, and served as its Treasurer; he had also a principal share in founding the Botanic Garden in that city. He was a member of the Council of the Wellington Philosophical Society for thirty-two years, was five times President, and was about to retire from that position when his death occurred.

In biology he took a keen but general interest, and we find in the list of his papers accounts of the birds, shells, and plants of various parts of the Dominion, anthropology, and cosmic phenomena. As a botanic collector, he transmitted plants to Kew from 1860 to 1880, and amongst them a series of plants well-known as *Veronica Traversii*, Hook. f., which was introduced to cultivation n Britain about 1873. The monotypic genus *Traversia* is now merged in *Senecio* and the species *T. baccharoides* is now *S. geminatus*, T. Kirk. About a dozen other plants were named after our late Fellow, as the following list will show:—*Ranunculus Traversii*, Hook. f. (now sunk in *R. Lyallii*, Hook. f.), *Drimys Traversii*, T. Kirk (formerly *Hymenanthera Traversii*, J. Buch.), *Aciphylla Traversii*, Hook. f., *Olearia Traversii*, Hook. f. (formerly *Eurybia Traversii*, F. Muell.), *Celmisia Traversii*, Hook. f., *Gnaphalium Traversii*, Hook. f., *Senecio Traversii*, F. Muell. (now sunk in *S. bellidioides*, Hook. f.), *Dracophyllum Traversii*, Hook. f., *Myosotis Traversii*, Hook. f., *Veronica Traversii*, Hook. f., mentioned above, *Pimelea Traversii*, Hook. f., and *Carex Traversii*, T. Kirk, now considered conspecific with *C. Dallii*, T. Kirk. [B. D. J.]

James Herbert Veitch came of the well-known family of that name, was born at Chelsea in 1868, and educated at Crawford College, Maidenhead, continued technically in France and Germany. He entered upon business in 1885, then, when 23 years of age, he undertook a voyage to India, Malaya, Japan, Corea, Australia, and New Zealand, to study the floras of those regions and the conditions of growth, with a view to enrich the number of cultivated plants by additional species. During this round he sent letters to his uncle, Mr. Harry James Veitch, which were printed in the 'Gardeners' Chronicle' from early in 1892 to the end of 1893, describing the various gardens and nurseries he had visited. He amplified and supplemented these letters after his return home in 1893, and the resulting quarto volume appeared in 1896 as 'A Traveller's Notes.' In 1898 his firm became a private limited liability company, and the subject of our notice, two years later,

succeeded to the post of Managing Director, his brother, John Gould Veitch the younger, being Secretary. Soon after this, Messrs. Veitch decided to revive the old custom of their house, and dispatched Mr. E. H. Wilson to China, and later to the extreme west of China and to Japan, resulting in a rich harvest of novelties, both from the botanist's and the horticulturist's point of view. His last work was the compilation of the sumptuous 'Hortus Veitchii,' 1906, in which the history of the firm and accounts of their numerous collectors are attractively set forth. He died at the early age of 39, on the 13th November, 1907, and was buried at Exeter, the ancestral home of his race. [B. D. J.]

John Francis Walker, who was elected Fellow on the 17th April, 1873, and died at York 23rd May, 1907, was born in that city 25th November, 1839, his family having resided there for many generations. After his early schooldays at St. Peter's School, he studied at Cirencester College, and in 1862 entered Sidney Sussex College, Cambridge, and was bracketed first in the Natural Science Tripos in 1866. After taking his degree he studied chemistry at Bonn, and after the Franco-German war he returned to this country, was called to the Bar, but never practised. In 1882 he married and retired to York, devoting himself to the Brachiopoda, and especially the Mesozoic Brachiopoda, of which group his knowledge was large, and to promoting the collections of the York Museum, of which he became Honorary Curator. Besides our own Society, he was Fellow of the Geological and Chemical Societies. He was author of a score of papers on geological topics. [B. D. J.]

Charles Augustus Wright, the third son of John Wright, Esq., was born at Cumberland Terrace, Regent's Park, 1834. He was privately educated, and at a comparatively early age accompanied his parents to Algiers and afterwards to Malta, where he resided many years. He acted, from about 1865 to 1874, as correspondent for 'The Times' in the Mediterranean, being also present with a small squadron detailed to watch British interests during the Intransigeante disturbances of 1873 at Carthagena. In the same year he participated in a cruise to the Levant and the Dardanelles; and in 1874 he accompanied the Fleet under Admiral Sir J. R. Drummond, in its expedition to the same waters. In his younger days a keen sportsman, Mr. Wright devoted himself to the Natural History and especially the Ornithology of Malta while he lived there; and his "List of Birds observed in the Islands of Malta and Gozo," commenced in the 'Ibis' for 1864, with appendices in 1864–65, 1869, 1870, 1874, was made by Dr. Blasius the basis (with full acknowledgment of its use) of his "Ornis von Malta und Gozo" ('Ornis' for August 1895), and was noticed by Dr. P. L. Sclater in his opening address to the Biological Section of the British Association, August 25th, 1875, pp. 90, 117.

The Maltese Avifauna possesses special interest in relation to the course and circumstances of distribution and migration; and Mr. Wright's collection included twelve species never previously recorded from those Islands, of which two were altogether new to any part of Europe. Authentic specimens of ten out of the twelve were presented by him to the Italian National Museum at Florence, viz.:—*Saxicola leucopyga*, *Saxicola stapazina* (or *deserti*), *Merops persicus*, *Caprimulgus ruficollis*, *Bartramia longicaudata*, *Cypselus pallidus*, *Hoplopterus spinosus*, *Aedon galactodes*, *Charadrius fulvus*, and *Erythrospiza githaginea*.

In the 'Proceedings' of the Zoological Society of London, April 6th, 1875, Mr. Wright contributed a paper on the "Specific Identity of the Weasel found in Malta," in which it was pointed out that the Maltese Weasel cannot be purely identified with the common Weasel of Southern Italy, nor with the local 'Boccamele' of Sardinia. One of the examples on which this paper was founded was presented to the Natural History Branch of the British Museum (South Kensington); and later, at the request of the Museum authorities, five more specimens of the Maltese Weasel were sent for special examination from Mr. Wright's private collection, with the result that the Maltese Weasel has been now referred by Mr. Oldfield Thomas (see Proceedings Zool. Soc. London, Feb. 5th, 1895) to the extra-European species *Putorius africanus*, Desm.

Mr. Wright's attention was by no means confined to the higher forms of animal life in the Malta group, or to their living representatives, and his efforts to explore the fossil fauna led to the discovery of remains of the Mastodon in the Lower Miocene of Gozo, and of Halitherium also (see A. Leith Adams in Journ. Geol. Soc. London, Aug. 1879).

He had also formed a Herbarium of the Flowering Plants and Ferns of Malta, of much interest; and was an enthusiastic conchologist, his fine collection being rich in Mediterranean shells particularly.

Mr. Wright was made a Knight of the Order of the Crown of Italy on the 22nd March, 1883, by the late King Humbert. He was elected on 5th December, 1878, as a Fellow of this Society, and in 1880 of the Zoological Society of London. He was also a member of the British Ornithologists' Union, of the Essex Field Club, and the Norwich Natural History Society. His first contribution to the 'Ibis' was an account of a visit to Filfila, an islet on the south coast of Malta, in 1863, and his last a letter on a Greenland Falcon shot at Lewes in 1883. For some years past Mr. Wright resided at Kew, and though latterly much crippled and often suffering from rheumatic complaints, he maintained a lively interest in various branches of Natural History, and with devoted assistance from members of his family continued the formation of a British Herbarium, which includes many fine and interesting examples of our native phanerogamic flora. He lost no opportunity of learning from friends, so far as

health permitted, all that was going on in Ornithological circles, and among Systematic Botanists, at the Zoological Gardens, or at the Linnean Society; he was able to take part in the fourth Ornithological Congress in London in 1905, and the last public function he attended was the Evening Reception at the Rooms of our own Society on the 7th June, 1907.

Our late Fellow's acquaintance with the Island of Malta, its people, languages and history, was such as not many have acquired: he was a Vice-President of the local Archæological Society, and in 1874 shared in the discovery, through its efforts, of interesting remains of early Christian buildings near Marsa.

Latterly, and especially in 1907 (which was his seventy-fourth year), repeated illness and the loss of friends, Charles Baron Clarke and Sir D. Brandis particularly, told on Mr. Wright's naturally vigorous constitution, and an outdoor task which proved beyond his strength resulted in an accident, producing injuries to which he succumbed on the 13th July, 1907. One of his last requests was that a flowering spray from an exotic *Lathyrus* which he had raised in his garden at "Kayhough" (Kew Gardens), where he had lived since 1876, should be sent to a friend who was interested with himself in its determination. [J. R. Drummond.]

June 4th, 1908.

Dr. D. H. Scott, M.A., F.R.S., President, in the Chair.

On taking the Chair, Dr. Scott thanked the Society for the honour done him, by his election as President.

The Minutes of the Anniversary Meeting of the 25th May, 1908, were read and confirmed.

The President announced that he had appointed the following to be Vice-Presidents during the current Session—Prof. W. A. Herdman, F.R.S., Mr. Horace W. Monckton, Treas.L.S., Lieut.-Col. Prain, F.R.S., and Dr. A. Smith Woodward, F.R.S.

Miss Ethel Louise de Fraine and Mr. Joseph Hubert Priestley were admitted Fellows.

Mr. Joseph Pearson, M.Sc., was proposed as a Fellow.

Mr. Ernest Melville Cutting, B.A. (Cantab.), Mr. Louis Charles Deverell, F.G.S., Mr. James Montagu Francis Drummond, B.A. (Cantab.), Mr. Charles Aubrey Ealand, Mr. Cecil Hallworth Treadgold, M.A. (Cantab.), and Miss Grace Wigglesworth, M.Sc. (Manc.), were severally balloted for and elected Fellows.

Mr. C. E. Salmon, F.L.S., exhibited a series of original coloured drawings, and lithographs from them, from Descourtilz's 'Ornithologie brésilienne.'

Mr. F. Enock, F.L.S., exhibted a series of lantern-slides illustrative of the life-history of wood-boring wasps, showing their method of capturing prey, and storing the same in their excavated burrows, with the extraordinary faculty shown for seizing the selected species and no other, for the food of the future larvæ. He mentioned that one of the species he had had under his own observation had brought to its burrow, in one day, 27 specimens of *Tipula imperialis*, a species so rare that he himself had only met with one specimen during a series of many years.

The following papers were read :—

1. "Note on the Spicules of *Chiridota geminifera*, Dendy & Hindle." By Prof. A. Dendy, D.Sc., F.R.S., Sec.L.S.
2. "The Caryophyllaceæ of Tibet." By F. N. Williams, F.L.S.
3. "The Polychæta of the Indian Ocean." By F. A. Potts. (Communicated by J. Stanley Gardiner, M.A., F.R.S., F.L.S.)
4. "On *Koonunga cursor*; a remarkable new type of malacostracous Crustacea." By O. A. Sayce. (Communicated by Dr. W. T. Calman, F.L.S., F.Z.S.)
5. "The Stylasterina of the Indian Ocean." By Dr. S. J. Hickson, F.R.S., and Miss Helen M. England. (Communicated by J. Stanley Gardiner, M.A., F.R.S., F.L.S.)
6. "A Contribution to the Mycology of South Africa." By Messrs. W. N. Cheesman, F.L.S., and T. Gibbs.

June 18th, 1908.

Dr. D. H. Scott, M.A., F.R.S., President, in the Chair; afterwards Dr. A. Smith Woodward, F.R.S., V.-P.

The Minutes of the General Meeting of the 4th June were read and confirmed.

The President referred to the recent disuse of the Library Recommendation Book by the Fellows, the last entry being nearly five years old.

Mr. Ernest Melville Cutting was admitted a Fellow.

Miss Eleanor Pearse and Mr. James Moore Williams were proposed as Fellows.

Miss Helen Stuart Chambers, B.Sc., Mr. Norman Gill, and Mr. Henry Herbert Travers were severally balloted for and elected Fellows.

Mrs. Harry Gay exhibited a volume of drawings of plants from the Island of Bombay, part of a series of 1700 she had painted during a residence there of fourteen years.

Mr. C. H. Wright, A.L.S., exhibited on behalf of Mr. J. F. Duthie, F.L.S., specimens of *Melitella pusilla*, a new genus of Compositæ described recently by Cav. Sommier, from material collected by him in the island of Gozo, near Malta. Dr. Stapf, Mr. Worsdell, and the President joined in a discussion.

Mr. W. C. Worsdell, F.L.S., exhibited a large series of seedlings of the Scarlet Runner bean, *Phaseolus multiflorus*, exhibiting artificial fasciation induced by cutting away the plumule early in its growth. The President and Dr. Stapf contributed some remarks, the Author briefly replying.

The following papers were read:—

1. "Altitude and Distribution of Plants in Southern Mexico." By Dr. Hans Gadow, F.R.S. (Communicated by Dr. A. B. Rendle, F.L.S.)
2. "Reports on the Marine Biology of the Sudanese Red Sea from Collections made by Cyril Crossland, M.A., B.Sc., F.Z.S., together with Collections made in the Red Sea by Dr. R. Hartmeyer.—On the Bryozoa, Part I. Cheilostomata." By Arthur Wm. Waters, F.L.S.
3. "The Algæ of the Yan Yean Reservoir." By G. S. West, F.L.S.
4. "On *Gardenia Thunbergia* and its allies." By Dr. Otto Stapf, F.R.S., Sec.L.S., and J. Hutchinson.
5. "The Marine Algæ collected in the Indian Ocean by H.M.S. 'Sealark.'" By A. Gepp, M.A., F.L.S.
6. "Nudibranchs from the Red Sea, collected by Mr. C. Crossland." By Sir Charles Eliot, K.C.M.G. (Communicated by Prof. Herdman, F.R.S., F.L.S.)

DARWIN-WALLACE MEDAL.
1st July, 1908.

SPECIAL GENERAL MEETING

held on the 1st July, 1908, in the Institution of Civil Engineers, at 2.30 p.m.

Dr. D. H. Scott, F.R.S., President, in the Chair.

The President welcomed the Delegates and other guests in a brief address.

The first award of the Darwin-Wallace Medal, specially struck to commemorate the 50th anniversary of the reading of the joint papers by Charles Robert Darwin and Alfred Russel Wallace, was then made. The gold medal was presented to the surviving essayist, Dr. Wallace, F.R.S., F.L.S., the President addressing him and setting out the reasons which had caused the Council to hold this Special Meeting, to which Dr. Wallace made a reply.

In succession the following six received silver copies of the medal, the President in each case reciting the claims of the recipient, and each of the medallists present, in turn, replying.

Sir Joseph Dalton Hooker, O.M., G.C.S.I., F.R.S., F.L.S.
Prof. Ernst Haeckel, F.M.L.S.
Prof. Eduard Strasburger, F.M.L.S.
Prof. August Weismann, F.M.L.S.
Dr. Francis Galton, F.R.S.
Sir Edwin Ray Lankester, K.C.B., F.R.S., F.L.S.

Profs. Haeckel and Weismann being prevented by professorial duties from being present, their medals were received on their behalf by Herr von Bethmann-Hollweg, Secretary of the German Embassy.

The reception of the Delegates of Corporate Bodies then followed. The first group, consisting of representatives from Universities and Schools, was introduced by speeches from Dr. Francis Darwin, F.R.S., F.L.S., and Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S., F.L.S.

Christ's College, Cambridge: The Master, Dr. J. Peile.
Shrewsbury School: The Chief Science Master, Mr. C. J. Baker.
Hertford Grammar School: The Headmaster, Mr. G. W. Kinman, M.A.

The above College and Schools were connected with the early training of Darwin and Wallace.

The University of Oxford: The Vice-Chancellor, Dr. T. H. Warren.
" " Prof. E. B. Poulton, D.Sc., F.R.S., F.L.S.
" " Dr. A. H. Church.
" Cambridge: Dr. Francis Darwin, F.R.S., F.L.S.
" St. Andrews: Prof. P. R. Scott Lang, M.A., B.Sc. (with address).
" Glasgow: Prof. J. Graham Kerr, M.A., F.L.S.
" Aberdeen: Lt.-Col. Prain, C.I.E., LL.D., F.R.S., F.L.S. (with address).
" Edinburgh: Prof. I. Bayley Balfour, M.D., F.R.S., F.L.S. (with address).
" Dublin: Prof. H. H. Dixon, D.Sc., F.R.S. (with address).
(Dr. Dixon was unable through illness to present the address himself, which was done on his behalf by the General Secretary.)
" Durham: Prof. M. C. Potter, F.L.S.
" London: Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S., F.L.S. (with address).
" Manchester: Prof. F. E. Weiss, D.Sc., F.L.S. (with address).
" Wales: Prof. R. W. Phillips, D.Sc., F.L.S.
" Birmingham: The Vice-Chancellor, Sir Oliver Joseph Lodge, D.Sc., F.R.S.
" Liverpool: Prof. W. A. Herdman, D.Sc., F.R.S., Past President L.S. (with address).
" Leeds: Prof. V. H. Blackman, Sc.D., F.L.S.
" Sheffield: Prof. Denny, F.L.S.
University College, Bristol: The Principal, Prof. C. Lloyd Morgan, F.R.S. (with address).
" Nottingham: Prof. J. W. Carr, F.L.S.

The second group represented Academies and Societies, and was introduced by speeches from Prof. Einar Lönnberg, Ph.D., and Sir Archibald Geikie, K.C.B., Sec.R.S.

The Royal Swedish Academy of Science, Stockholm: Prof. E. Lönnberg, Ph.D. (with address).

The Royal Society: Sir Archibald Geikie, K.C.B.
The Society of Antiquaries: The Lord Avebury, P.C., F.R.S., F.L.S. (with address).
The Royal Irish Academy: Dr. R. F. Scharff, F.L.S.

The Manchester Literary and Philosophical Society: Mr. C. Bailey, M.Sc., F.L.S.
The Royal Society of Edinburgh: Prof. D'Arcy Thompson, C.B., F.L.S. (with address).
The Geological Society of London: Mr. W. H. Hudleston, F.R.S., F.L.S.
The Cambridge Philosophical Society: Dr. S. F. Harmer, F.R.S.
The Royal Astronomical Society: The President, Mr. H. F. Newall, F.R.S.
The Zoological Society of London: Mr. G. A. Boulenger, F.R.S.
The British Association: The President, Sir David Gill, K.C.B., F.R.S.
The Entomological Society of London: The President, Mr. C. O. Waterhouse.
The Royal Microscopical Society: The President, The Lord Avebury, P.C., F.R.S., F.L.S. (with address).
The Chemical Society: Dr. Horace T. Brown, F.R.S., F.L.S.
The Marine Biological Association: Mr. A. E. Shipley, F.R.S., F.L.S.
The Malacological Society: Mr. R. H. Byrne, F.Z.S.

The British Academy: The President, Sir E. Maunde Thompson, K.C.B. (with address).

The Lord Avebury then gave an address, for which a vote of thanks was proposed from the Chair, and accorded by acclamation.

The proceedings then closed.

A dinner of the Fellows took place at the Princes' Restaurant, Piccadilly, at 6.30 P.M., at which the following Medallists and Foreign guests were present:—Prof. Strasburger, Dr. Galton, Sir Ray Lankester, Prof. Einar Lönnberg, Prof. Hubrecht, and Prof. Warming. The total number amounted to ninety.

At 9.30 a reception was held in the Rooms of the Society in Burlington House, the guests being received by Dr. D. H. Scott and Mrs. Scott. Various objects were on view in the Library, and two lantern demonstrations were given in the Meeting Room, by Prof. Seward, F.R.S., F.L.S. "The Jurassic Vegetation of the World—a Study in Plant-Migration," and by Dr. A. Smith Woodward, F.R.S., F.L.S., "The Evolution of Mammals in South America."

A full description is given in the special volume.

ABSTRACTS.

Abstract of Prof. Weiss's Paper on the Morphology of *Stigmaria* and of its Appendages in Comparison with Recent Lycopodiales.

[Read 5th March, 1908.]

The opposition to the identification of *Stigmaria* as the "root-system" of *Sigillaria* has gradually disappeared owing to the accumulation of evidence supporting Binney's discovery in 1845 of an organic connection between *Stigmaria* and *Sigillaria*. But the recognition of this fact and its subsequent extension to the case of *Lepidodendron* did not settle definitely the morphological value of the Stigmarian axis. It might still be regarded either as a large bifurcating root bearing lateral roots or as an underground stem (rhizome), in which case its appendages might be adventitious roots (Scott) or leaves modified to serve absorptive purposes (Solms-Laubach), or possibly both kinds of lateral organs might be present (Renault). Some recent observations have tended to reopen the discussion of the morphology of the appendages, particularly the recognition of peripheral "transfusion" tracheids in the Stigmarian appendages and the presence of a parichnos-strand in these organs. But though both have their counterpart in the leaves of the Lepidodendraceæ, I can only see analogy and not homology in these structures, and believe their presence is due to the physiological requirements of the organs in question.

The older objection to the identification of the appendages as rootlets, namely their exogenous origin, is sufficiently answered by the fact that several recent Lycopodiales, such as *Phylloglossum* and the young sporophyte of *Isoëtes*, have exogenous roots. The regular quincuncial arrangement of the rootlets similar to that of the leaves of the Lepidodendraceæ might be explained by the fact that we know of rootlets placed close to the base of the leaves of certain Sigillariæ (*Sigillaria spinulosa*).

A suppression of the leaves on the underground axis might leave the rootlets with the same arrangement as the leaves in the aerial portion of the stem. These considerations and the very close agreement in structure of these problematical appendages with the monarch roots of *Isoëtes*, seem to me strong reasons for regarding the Stigmarian appendages as true roots.

As regards the axes on which they were borne, their structure, so different from that of the rootlets and so singularly unlike the roots of any living plant, seems to prevent our regarding them as main roots. Their cauline nature has been questioned on account of the difference in their structure from that of the aerial stems of the Lepidodendraceæ. But recent evidence in confirmation of Renault's observations of the existence of *Stigmariæ* with centripetal wood partially removes this objection. Still, in the case of

the Lycopodiales we are not limited to the two alternatives root or stem, since Goebel and Bruchmann have shown that the rhizophores of *Selaginella* are indeterminate organs which can develop either as root-bearers or as leafy shoots. Their position in the young sporophyte of *Selaginella* is very suggestive of analogy with the Stigmarian axes, and attention has been drawn to this by Scott, Bower, and others. But the peculiarly root-like structure of these rhizophores and the fact that they produce their roots endogenously, shows that they are in *Selaginella* very highly specialised. The Stigmarian axes though undoubtedly analogous structures are more stem-like in their character and probably more primitive. A more useful comparison might therefore be made between *Stigmaria* and the very primitive *Phylloglossum*.

Here we have not only exogenous and adventitious roots developed at the base of the leaves (cf. *Sigillaria spinulosa*), but in similar positions one or more outgrowths are produced which serve the purpose of vegetative reproduction. But though specialised for this function, they are, I believe, of the same indeterminate nature as the rhizophores of *Selaginella*; and as they show more resemblance to true shoots and bear their roots exogenously, they are really more closely analogous to the Stigmarian axis. Organs of this nature would probably have bifurcated in the case of the extinct Lycopodiales, to keep pace with the physiological requirements of the branching main axis. They may possibly possess the power of forming under certain conditions upright leafy stems, which would explain some structures figured and described by Grand'Eury and others.

The conformation of the underground axes of *Stigmariopsis* and the still more pronounced contraction of the base of *Pleuromeia* and of *Isoëtes*, would be explained by reduction of the requirements of the plants so far as root-absorption was concerned.

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BENEFACTIONS.

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1864.

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1865.

Executors of Sir J. W. Hooker, £100.
George Bentham, Esq.: cost of 10 plates for his "Tropical Leguminosæ," Trans. vol. xxv.

1866.

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Royal Society: Grant in aid of G. S. Brady on British Ostracoda, £80.

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1880.

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1888.

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Dr. J. E. T. Aitchison, towards the same, £25.
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Royal Swedish Academy of Science: Copies of portraits of C. von Linné, after Per Krafft the elder, and A. Roslin, by Jean Haagen.

1907.

Royal University of Uppsala: Copy by Jean Haagen of portrait of C. v. Linné, by J. H. Scheffel (1739).

Royal Society: Third and final grant towards 'Biscayan Plankton,' £50.

The Trustees of the Percy Sladen Memorial Fund: First grant towards publication of Mr. Stanley Gardiner's Researches in the Indian Ocean in H.M.S. 'Sealark,' £200.

1908.

Prof. Gustaf Retzius: Plaster cast of bust of Carl von Linné, modelled by Walther Runeberg from the portrait by Scheffel (1739) at Linnés Hammarby; the bronze original is for the façade of the new building for the Royal Academy of Science, Stockholm.

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The death of Sir James Hector took place at Wellington, New Zealand, on the 6th November, 1907.

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List of [Fellows, Associates, and Foreign Members], 1907–1908.